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Salas, Jose A.  
Sanchez, Cesar  
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<120> BORRELIDIN PRODUCING POLYKETIDE SYNTHASE AND ITS USES

<130> 4408-P03626US00

<140> US 10/534,210

<141> 2005-05-06

<150> PCT/GB03/005704

<151> 2003-12-24

<150> GB0230217.2

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Ile	Gly	Pro	Leu	Trp	Val	Ala	Thr	Arg	Gln	Ala	Val	Ser	Val	Asp	Gly				
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Ala	Asp	Glu	Arg	Met	Arg	Asp	Leu	Val	Ala	Gln	Ala	Leu	Thr	Ala	Pro				
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Arg Glu Pro Ile Ala Ile Val Gly Met Ser Cys Arg Leu Pro Gly Gly  
35 40 45  
Val Asn Ser Pro Glu Glu Phe Trp Ser Leu Leu Glu Ala Gly Thr Asp  
50 55 60  
Ala Val Ser Glu Phe Pro Arg Asp Arg Gly Trp Asp Val Glu Arg Leu  
65 70 75 80  
Tyr Asp Pro Asp Pro Asp Ala Pro Gly Lys Ser Tyr Val Arg Glu Gly  
85 90 95  
Gly Phe Leu Asp Gly Ala Gly Arg Phe Asp Pro Ala Phe Phe Gly Ile  
100 105 110  
Ser Pro Arg Glu Ala Val Val Met Asp Pro Gln Gln Arg Leu Leu Leu  
115 120 125  
Glu Cys Ser Trp Glu Ala Ile Glu Arg Ser Arg Ile Asp Pro Lys Thr  
130 135 140  
Leu His Gly Ser Arg Ala Gly Val Phe Val Gly Ser Asn Gly Gln Asp  
145 150 155 160  
Tyr Gly Thr Leu Leu Arg Ala Asp Asp Arg Ser His Ala Tyr Leu  
165 170 175  
Ala Thr Gly Ala Ser Ala Ser Val Leu Ser Gly Arg Ile Ser Tyr Thr  
180 185 190  
Leu Gly Leu Glu Gly Pro Ala Val Thr Ile Ser Thr Ala Cys Ser Ser  
195 200 205  
Ser Leu Val Ala Leu His Leu Ala Ala Arg Ala Leu Arg Ala Gly Glu  
210 215 220  
Cys Glu Leu Ala Leu Ala Gly Gly Val Thr Val Met Pro Thr Thr Arg  
225 230 235 240  
Leu Phe Glu Val Phe Ser Arg Gln Arg Gly Leu Ala Gly Asp Gly Arg  
245 250 255  
Cys Lys Ala Phe Ala Ala Gly Ala Asp Gly Thr Gly Trp Gly Glu Gly  
260 265 270  
Val Gly Val Leu Val Leu Glu Arg Leu Ser Val Ala Arg Arg Asn Gly  
45

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Ala 305	Ser	Asn	Gly	Leu	Thr 310	Ala	Pro	Asn	Gly	Pro 315	Ser	Gln	Gln	Arg	Val 320		
Ile	Arg	Ala	Ala	Leu 325	Ala	Ser	Ala	Arg	Leu 330	Ala	Pro	Glu	Asp	Val 335	Asp		
Ala	Val	Glu	Ala 340	His	Gly	Thr	Gly	Thr 345	Ser	Leu	Gly	Asp	Pro 350	Ile	Glu		
Ala	Gln	Ala 355	Leu	Leu	Ala	Thr	Tyr 360	Gly	Arg	Gly	Arg	Asp 365	Ala	Glu	Arg		
Pro	Leu 370	Trp	Leu	Gly	Ser	Val 375	Lys	Ser	Asn	Ile	Gly 380	His	Ala	Gln	Ala		
Ala 385	Ala	Gly	Val	Ala	Gly 390	Val	Ile	Lys	Met	Val 395	Lys	Ala	Met	Gln	Ala 400		
Gly	Thr	Leu	Pro	Arg 405	Thr	Leu	His	Val	Asp 410	Glu	Pro	Ser	Gly	Glu 415	Val		
Asp	Trp	Asp	Ser 420	Gly	Ala	Val	Arg	Leu 425	Leu	Thr	Glu	Ala	Arg 430	Asp	Trp		
Pro	Ser	Glu 435	Glu	Gly	Arg	Leu	Arg 440	Arg	Ala	Gly	Val	Ser 445	Ser	Phe	Gly		
Ile	Ser 450	Gly	Thr	Asn	Ala	His 455	Val	Ile	Leu	Glu	Glu 460	Pro	Pro	Ala	Glu		
Asp 465	Ala	Val	Pro	Glu	Pro 470	Glu	Ala	Gly	Asp	Val 475	Val	Pro	Trp	Val	Leu 480		
Ser	Ala	Arg	Ser	Ala 485	Glu	Ala	Leu	Arg	Glu 490	Gln	Ala	Ala	Arg	Leu 495	Ala		
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Ser	Thr	Arg 515	Ala	Ala	Phe	Glu	His 520	Arg	Ala	Val	Val	Val 525	Gly	Arg	Glu		
Arg	Glu 530	Glu	Leu	Leu	Ala	Gly 535	Leu	Phe	Ala	Val	Ala 540	Ala	Gly	Arg	Pro		
Ala 545	Ala	Asn	Val	Val	Thr 550	Gly	Pro	Val	Ser	Ser 555	Gly	Arg	Pro	Ala	Phe 560		
Val	Phe	Ala	Gly	Gln 565	Gly	Ser	Gln	Arg	Leu 570	Gly	Met	Gly	Arg	Gly 575	Leu		
Tyr	Glu	Arg	Phe 580	Pro	Val	Phe	Ala	Glu 585	Ala	Phe	Asp	Glu	Val 590	Cys	Gly		
Arg	Val	Gly 595	Pro	Gly	Val	Arg	Glu 600	Val	Val	Phe	Gly	Ser 605	Asp	Ala	Gly		
Glu	Leu 610	Asp	Arg	Thr	Val	Trp 615	Ala	Gln	Ala	Gly	Leu 620	Phe	Ala	Leu	Glu		
Val 625	Ala	Leu	Phe	Arg	Leu 630	Leu	Glu	Ser	Trp	Gly 635	Val	Arg	Pro	Gly	Cys 640		

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 645 650 655  
 Leu Trp Ser Leu Glu Asp Ala Cys Arg Val Val Ala Ala Arg Ala Arg  
 660 665 670  
 Leu Met Gln Ala Leu Pro Ala Gly Gly Val Met Val Ala Val Arg Ala  
 675 680 685  
 Glu Ala Gly Glu Leu Ala Gly Phe Leu Gly Glu Asp Val Val Ile Ala  
 690 695 700  
 Ser Val Asn Ala Pro Gly Gln Val Val Ile Ala Gly Pro Glu Gly Gly  
 705 710 715 720  
 Val Glu Arg Val Val Ala Ala Cys Gly Ala Arg Ser Arg Arg Leu Ala  
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 Val Ser His Ala Phe His Ser Pro Leu Val Glu Pro Met Leu Gly Glu  
 740 745 750  
 Phe Arg Arg Val Val Glu Ser Val Ala Phe Gly Val Pro Ser Leu Arg  
 755 760 765  
 Val Val Ser Asn Val Thr Gly Ala Trp Val Asp Pro Glu Glu Trp Gly  
 770 775 780  
 Thr Pro Glu Tyr Trp Val Arg Gln Val Arg Glu Pro Val Arg Phe Ala  
 785 790 795 800  
 Asp Gly Val Ala Thr Leu Leu Asp Ala Gly Val Arg Thr Phe Val Glu  
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 Leu Gly Pro Ala Gly Thr Leu Thr Ser Met Val Ser His Cys Ala Asp  
 820 825 830  
 Ala Thr Ala Thr Ser Val Thr Ala Val Pro Thr Leu Arg Pro Asp His  
 835 840 845  
 Asp Glu Ser Arg Thr Val Leu Ser Ala Ala Ala Ser Leu Tyr Val Gln  
 850 855 860  
 Gly His Pro Val Asp Trp Ala Pro Leu Phe Pro Arg Ala Arg Thr Val  
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 Asp Leu Pro Thr Tyr Pro Phe Gln His Gln His Tyr Trp Met Met Asn  
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 Thr Gly Ser Ala Ala Glu Pro Ala Glu Leu Gly Leu Gly Asp Ala Arg  
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 His Pro Leu Leu Gly Ser Val Val Thr Val Ala Gly Asp Asp Lys Val  
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 Val Phe Ala Gly Arg Leu Ala Leu Arg Thr His Pro Trp Leu Ala Asp  
 930 935 940  
 His Thr Val Leu Asp Ala Val Leu Leu Pro Ala Thr Ala Phe Leu Glu  
 945 950 955 960  
 Leu Ala Val Arg Ala Gly Glu Glu Val Ser Cys Pro Val Val His Asp  
 965 970 975  
 Leu Thr Leu His Arg Pro Leu Val Val Pro Glu Arg Gly Ala Val Gln  
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 Val Gln Met Ala Val Gly Ala Pro Glu Ala Asp Gly Arg Arg Glu Val  
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Arg Val Tyr Ser Arg Pro Asp Asp Asp Ala Glu His Glu Trp Thr Leu  
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 Ser Arg Ala Gly Thr Asp Ala Ile Arg Leu Asp Val Thr Asp Thr Ala  
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 Val Pro Cys Leu Asp Ser Glu Gly Pro His Gln Ala Thr Tyr Gln Ala  
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 Glu His Pro Gly Cys Phe Arg Leu Val Asp Ser Asp Asp Pro Asp Pro  
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 Ala Ile Arg Asp Gly Ala Val Leu Ala Pro Arg Leu Thr Ala Ala Ser  
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 Thr Gly Gly Ser Gly Ala Leu Ala Gly Ile Val Ala Gln His Leu Val  
 48



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Ala Arg His Gly Val Arg Arg Leu Val	Leu Ala Ser Arg Ser Gly Arg	
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Cys Asp Val Ser Asp Arg Asp Ala Val Ala Ala Leu Leu Ala Ser Val		
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Pro Asp Glu His Pro Leu Thr Ala Val Val His Thr Ala Gly Val Leu		
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Phe Ala Ala Lys Val Asp Gly Ala Arg His Leu His Glu Leu Thr Ser		
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His Leu Asp Leu Thr Ala Phe Val Leu Phe Ser Ser Ala Ser Ala Val		
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Leu Gly Ala Ala Gly Gln Gly Asn Tyr Ala Ala Ala Asn Ala Tyr Leu		
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Gly Asp Ala Glu Leu Thr Arg Ile Ser Arg Ile Gly Val Thr Ala Leu		
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Ser Ala Glu Asp Gly Met Arg Leu Phe Asp Ala Gly Cys Ala Gly Asp		
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Gln Ser Gln Leu Val Pro Met Arg Val Asp Thr Ala Ala Leu Arg Ala		
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Pro Pro Asp Gln Ser Leu Asp Ala Ala Gly Phe Asp Ser Leu Thr Ala		
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Ile Leu Thr Arg Leu Thr Leu Leu Lys Glu Thr Ala Ala Pro Ala Val		
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Gly Thr Ala Pro Val Ala Ala Pro Thr Glu Asp Asp Ala Ile Val Ile		
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Val Gly Met Ala Gly Arg Phe Pro Gly Gly Val Arg Thr Pro Glu Gly  
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 Ala Val Gly Lys Ser Tyr Val Arg His Gly Gly Phe Leu His Asp Val  
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 Ala Thr Pro Ala Gly Phe Glu Gly Thr Leu Gly Thr Gly Ser Ser Gly  
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 Ser Ile Ala Ser Gly Arg Ile Ser Tyr Thr Phe Asp Leu Thr Gly Pro  
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 Gly Gly Val Thr Val Met His Thr Pro Arg Pro Phe Val Glu Phe Ser  
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 Arg Gln Arg Gly Leu Ala Ala Asp Gly Arg Ser Lys Ala Phe Ala Ala  
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 Ser Ala Asp Gly Val Ala Trp Ala Glu Gly Ala Gly Ile Leu Val Leu  
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 Val Arg Gly Ser Ala Val Asn Gln Asp Gly Ala Ser Asn Gly Leu Thr  
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 Val Lys Ser Asn Ile Gly His Thr Gln Ala Ala Ala Gly Val Ala Ser  
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 Val Ile Lys Met Val Gln Ala Met Gln Ala Gly Val Leu Pro Arg Thr  
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 Val Arg Leu Leu Thr Glu Ala Arg Glu Trp Pro Ser Gly Glu Gly Arg  
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 51

2450	2455	2460
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Glu Gly Leu Val Ala Gln Gly Cys Arg Val Phe Leu Glu Ser Ser Pro 2500 2505 2510		
His Pro Val Leu Thr Val Gly Ile Glu Glu Ser Ala Asp Arg Val Val 2515 2520 2525		
Ala Leu Glu Ser Leu Arg Arg Gly Glu Gly Gly Leu Arg Arg Leu Val 2530 2535 2540		
Asp Ala Ala Gly Glu Ala Trp Val Arg Gly Val Pro Ile Asp Trp Ala 2545 2550 2555 2560		
Gly Met Leu Ala Gly Gly Arg Arg Val Asp Leu Pro Thr Tyr Pro Phe 2565 2570 2575		
Gln His Gln Pro Tyr Trp Leu Asp Ser Pro Arg His Pro Ala Gly Asp 2580 2585 2590		
Val Thr Ala Val Gly Leu Thr Glu Ala Gly His Ala Phe Val Pro Ala 2595 2600 2605		
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Leu Pro Ser Tyr Pro Trp Leu Ala Asp His Gln Val Leu Gly Gln Val 2625 2630 2635 2640		
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Thr Glu Glu Pro Gly Thr Arg Thr Val Ser Met His Ser Arg Arg Asp 2690 2695 2700		
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Pro Pro Pro Glu Pro Leu Pro Glu Trp Pro Pro Thr Gly Ala Met Pro 2725 2730 2735		
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 Val Leu Arg Pro Lys Ala Asp Ala Ala Trp His Leu His Glu Leu Thr  
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 Pro Leu Thr Arg Gly Phe Leu Glu Leu Gly Phe Asp Ser Leu Thr Ala  
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 Ala Thr Val Val Phe Asp His Pro Ser Pro Ala Ala Leu Ala Ala His  
 3395 3400 3405  
 Leu Val Glu His Leu Val Gly Thr Val Asp Pro Thr Ala Gln Ala Met  
 3410 3415 3420  
 Glu Gln Leu Glu Ala Leu Arg Arg Ser Val His Ala Ala Thr Pro Ala  
 3425 3430 3435 3440  
 Gly Gly Leu Asp Arg Ala Leu Val Thr Gln Arg Leu Thr Ala Leu Leu  
 3445 3450 3455  
 Asp Glu Met Arg His Val Asp Gly Pro Gly Gly Thr Glu Gly Pro Asp  
 3460 3465 3470  
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 Leu Ile Asp Asn Glu Leu Gly Ile Gly Gly Thr Gln  
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Asp Leu Arg Ser<sub>20</sub> Ala Arg Ala Arg Leu<sub>25</sub> Gln Glu Leu Glu Ser<sub>30</sub> Ala Asp  
Thr Asp Pro<sub>35</sub> Ile Ala Ile Ile Gly<sub>40</sub> Met Gly Cys Arg Leu<sub>45</sub> Pro Gly Gly  
Val Arg Thr Pro Glu Asp Leu<sub>55</sub> Trp Asp Leu Val Glu<sub>60</sub> Lys Lys His Asp  
Ala Ile Gly Pro Phe Pro<sub>70</sub> Ala Asp Arg Gly Trp<sub>75</sub> Asp Leu Glu Asn Leu<sub>80</sub>  
Tyr Asp Pro Asp Pro<sub>85</sub> Asp Ala Pro Gly Lys<sub>90</sub> Ala Tyr Val Arg Glu<sub>95</sub> Gly  
Gly Phe Val His<sub>100</sub> Asp Val Ala Gly Phe<sub>105</sub> Asp Ala Gly Phe Phe<sub>110</sub> Gly Ile  
Ser Pro Arg<sub>115</sub> Glu Ala Leu Ala Met<sub>120</sub> Asp Pro Gln His Arg<sub>125</sub> Leu Leu Leu  
Glu Cys<sub>130</sub> Ser Trp Glu Ala Leu<sub>135</sub> Glu Arg Ala Gly Ile<sub>140</sub> Asp Pro Ser Ser  
Leu<sub>145</sub> Glu Gly Thr Arg Thr<sub>150</sub> Gly Val Tyr Thr Gly<sub>155</sub> Leu Met Thr His Glu<sub>160</sub>  
Tyr Ala Thr Arg Leu<sub>165</sub> Pro Ser Ile Asp Glu<sub>170</sub> Glu Leu Glu Gly Val<sub>175</sub> Ile  
Gly Ile Gly Asn<sub>180</sub> Ala Gly Ser Val Ala<sub>185</sub> Ser Gly Arg Val Ser<sub>190</sub> Tyr Thr  
Leu Gly Leu<sub>195</sub> Asn Gly Pro Ala Val<sub>200</sub> Thr Val Asp Thr Ala<sub>205</sub> Cys Ser Ser  
Ser Leu<sub>210</sub> Val Ala Leu His Leu<sub>215</sub> Ala Ala Gln Ala Leu<sub>220</sub> Arg Gln Gly Gln  
Cys<sub>225</sub> Thr Leu Ala Leu Ala<sub>230</sub> Gly Gly Ala Ser Val<sub>235</sub> Ile Ala Ala Pro Thr<sub>240</sub>  
Val Phe Ala Thr Phe<sub>245</sub> Ser Arg Gln Arg Gly<sub>250</sub> Leu Ala Pro Asp Gly<sub>255</sub> Arg  
Cys Lys Ala Phe<sub>260</sub> Ser Ser Thr Thr Asp<sub>265</sub> Gly Thr Gly Phe Gly<sub>270</sub> Glu Gly  
Val Gly Val<sub>275</sub> Leu Val Leu Glu Arg<sub>280</sub> Leu Ser Asp Ala Arg<sub>285</sub> Arg Asn Gly  
His Glu Val Leu Ala Val Val<sub>295</sub> Arg Gly Ser Ala Val<sub>300</sub> Asn Gln Asp Gly  
Ala<sub>305</sub> Ser Ser Gly Phe Thr<sub>310</sub> Ala Pro Asn Gly Pro<sub>315</sub> Ser Gln Gln Asp Val<sub>320</sub>  
Ile Arg Glu Ala Leu<sub>325</sub> Ala Asp Gly Arg Leu<sub>330</sub> Thr Pro Ala Asp Val<sub>335</sub> Asp  
Val Val Glu Gly His Gly Thr Gly Thr<sub>345</sub> Arg Leu Gly Asp Pro<sub>350</sub> Ile Glu  
Ala Gln Ala<sub>355</sub> Leu Leu Ala Thr Tyr<sub>360</sub> Gly Arg Gly Arg Asp<sub>365</sub> Ala Asp Arg

Pro Leu Trp Leu Gly Ser Val Lys Ser Asn Ile Gly His Thr Gln Ala  
 370 375 380  
 Ala Ala Gly Val Ala Ser Val Ile Lys Met Val Gln Ala Met Gln Ala  
 385 390 395 400  
 Gly Val Leu Pro Arg Thr Leu His Val Asp Glu Pro Ser Gly Glu Val  
 405 410 415  
 Asp Trp Asp Ser Gly Ala Val Arg Leu Leu Thr Glu Ala Arg Glu Trp  
 420 425 430  
 Pro Ser Gly Glu Gly Arg Val Arg Arg Ala Gly Val Ser Ser Phe Gly  
 435 440 445  
 Ile Ser Gly Thr Asn Ala His Val Ile Leu Glu Glu Pro Pro Ala Glu  
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 Asp Ala Leu Pro Glu Pro Glu Ala Gly Asp Val Val Pro Trp Val Leu  
 465 470 475 480  
 Ser Ala Arg Ser Ala Glu Ala Leu Arg Glu Gln Ala Ala Arg Leu Ala  
 485 490 495  
 Ser Val Ala Gly Gly Leu Asn Val Val Asp Val Gly Trp Ser Leu Ala  
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 Ser Thr Arg Ala Ala Phe Glu His Arg Ala Val Val Val Gly Gly Asp  
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 Gly Val Gly Val Gly Ala Gly Gly Gly Val Val Leu Val Phe Ala Gly  
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 Gln Gly Cys Gln Trp Val Gly Met Gly Arg Glu Leu Leu Gly Ser Ser  
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 Leu Val Phe Ala Glu Ser Met Arg Glu Cys Ala Ala Ala Leu Ser Pro  
 580 585 590  
 Phe Val Asp Phe Ser Val Val Asp Val Leu Gly Ser Ala Gly Glu Leu  
 595 600 605  
 Gly Arg Val Glu Val Val Gln Pro Ala Leu Trp Ala Val Met Val Ser  
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 Leu Ala Arg Val Trp Arg Ser Trp Gly Val Pro Val Ala Ala Val Val  
 625 630 635 640  
 Gly His Ser Gln Gly Glu Ile Ala Ala Ala Thr Val Ala Gly Ala Leu  
 645 650 655  
 Ser Val Gly Asp Ala Ala Arg Val Val Ala Leu Arg Ser Arg Leu Ile  
 660 665 670  
 Ala Glu Arg Leu Ser Gly Leu Gly Gly Met Val Ser Val Ala Leu Ser  
 675 680 685  
 Arg Glu Arg Val Val Ser Leu Ile Ala Gly Val Pro Gly Val Ser Val  
 690 695 700  
 Ala Ala Val Asn Gly Ser Ser Ser Thr Val Val Ser Gly Glu Ala Ala  
 705 710 715 720  
 Gly Leu Glu Arg Val Leu Ala Ala Cys Val Ser Ser Gly Val Arg Ala  
 56



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Arg	Arg	Ile	Asp 740	Val	Asp	Tyr	Ala	Ser 745	His	Ser	Val	Gln	Val 750	Glu	Leu				
Ile	Arg	Glu 755	Glu	Leu	Leu	Gly	Val 760	Leu	Asp	Gly	Ile	Val 765	Pro	Arg	Ser				
Gly	Glu 770	Ile	Pro	Phe	Val	Ser 775	Thr	Val	Thr	Gly	Glu 780	Arg	Ile	Asp	Thr				
Val 785	Glu	Leu	Gly	Ala	Glu 790	Tyr	Trp	Tyr	Arg	Asn 795	Leu	Arg	Gln	Thr	Val 800				
Glu	Phe	Gln	Ser	Val 805	Val	Glu	Gly	Leu	Val 810	Ala	Gln	Gly	Cys	Arg 815	Val				
Phe	Leu	Glu	Ser 820	Ser	Pro	His	Pro	Val 825	Leu	Thr	Val	Gly	Ile 830	Glu	Glu				
Ser	Ala	Asp 835	Arg	Val	Val	Ala	Leu 840	Glu	Ser	Leu	Arg	Arg 845	Gly	Glu	Gly				
Gly	Leu 850	Arg	Arg	Leu	Val	Asp 855	Ala	Ala	Gly	Glu	Ala 860	Trp	Val	Arg	Gly				
Val 865	Pro	Ile	Asp	Trp	Ala 870	Gly	Met	Leu	Ala	Gly 875	Gly	Arg	Arg	Val	Asp 880				
Leu	Pro	Thr	Tyr	Pro 885	Phe	Gln	His	Gln	Pro 890	Tyr	Trp	Leu	Asp	Ser 895	Pro				
Arg	His	Pro	Ala 900	Gly	Asp	Val	Thr	Gly 905	Pro	Gly	Asp	Asp	Glu 910	Phe	Trp				
Ala	Ala	Val 915	Glu	His	Gly	Glu	Ala 920	Thr	Glu	Leu	Ala	Asp 925	Leu	Leu	Arg				
Arg	Ser 930	Ala	Ala	Glu	Pro	Gly 935	Gln	Asp	Leu	His	Ala 940	Pro	Val	Ala	Ala				
Leu 945	Leu	Pro	Thr	Leu	Ala 950	Thr	Trp	Arg	Arg	Asp 955	Arg	Gln	Arg	Arg	Ala 960				
Ala	Val	Asp	Ser	Trp 965	Arg	Tyr	Arg	Ile	Val 970	Trp	Arg	Pro	Val	Ala 975	Thr				
Pro	Ser	Tyr	Asp 980	Arg	Val	Leu	Ser	Gly 985	Arg	Trp	Ala	Val	Val 990	Val	Pro				
Ala	Gly	His 995	Glu	Asp	Asp	Pro	Val 1000	Val	Asp	Trp	Val	Cys 1005	Ser	Ala	Leu				
Arg 1010	Asp	His	Gly	Gly	Glu	Pro 1015	Glu	Arg	Met	Val	Leu 1020	Gly	Pro	Arg	Glu				
Ser 1025	Arg	Ser	Ala	Leu 1030	Ala	Thr	Arg	Leu	Ala 1035	Ala	Asp	Pro	Pro	Gly 1040	Gly				
Val	Val	Ser	Leu 1045	Leu	Gly	Leu	Ser	Gly 1050	Ala	Ala	His	Pro	Asp	His 1055	Glu				
Val	Leu	Pro	Ser 1060	Ala	Val	Ala	Gly	Thr 1065	Val	Leu	Leu	Ala	Gln 1070	Ala	Leu				
Ser	Asp 1075	Gly	Ala	Val	Arg	Ala	Pro 1080	Val	Trp	Thr	Leu 1085	Thr	Arg	Asn	Gly				

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 Val Trp Ala Val Ala Arg Val Ala Gly Leu Glu His Pro Glu Ala Trp  
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 Gly Gly Leu Leu Asp Leu Pro Asp Arg Leu Asp Asp Arg Ala Ala Ala  
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 Arg Phe Ala Ala Val Leu Ser Ala Gly Glu Asp Glu Asp Gln Leu Ala  
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 Leu Arg Asp Ala Gly Leu Leu Ala Arg Arg Leu Val Arg Ala Pro Val  
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 Pro Arg Asp Ala Val Thr Ala Gly Trp Gln Pro Arg Asp Thr Ala Leu  
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 Val Thr Gly Gly Thr Gly Gly Leu Gly Gly Gln Val Ala Arg Trp Leu  
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 Glu Ala Glu Gly Ala Asp Arg Leu Arg Asp Asp Leu Thr Ala Leu Gly  
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 Val Gln Val Thr Phe Gly Ala Cys Asp Val Ala Asp Arg Ala Ala Leu  
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 Met Thr Ala Ala Ala Gly Glu Glu Trp Trp Ser Arg Gln Gly Leu Arg  
 1365 1370 1375  
 Phe Met Ala Pro Glu Ala Ala Leu Asp Ala Leu Arg Gln Ala Val Asp  
 1380 1385 1390  
 Arg Ala Glu Ser Thr Leu Val Val Ala Asp Ile Asp Trp Lys Thr Phe  
 1395 1400 1405  
 Ala Pro Leu Phe Thr Ser Ala Arg Ser Arg Pro Leu Ile Thr Asp Ile  
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 Pro Glu Ala Arg Pro Glu Pro Arg Pro Glu Gly Ala Asp Gln Pro Thr  
 1425 1430 1435 1440  
 Gln Gly Leu Val Ala Lys Leu Ala Val Leu Ser Ala Asp Glu Arg Arg  
 1445 1450 1455

Arg Ala Leu Leu Ala Glu Val Arg Ala Gln Ala Ala Val Val Leu Gly  
 1460 1465 1470  
 His Pro Gly Ala Asp Ala Val Pro Val Asp Arg Pro Phe Arg Glu Leu  
 1475 1480 1485  
 Gly Phe Asp Ser Leu Ser Ala Val Lys Leu Arg Asn Arg Ile Val Ala  
 1490 1495 1500  
 Ala Thr Gly Leu Glu Leu Pro Ala Thr Leu Val Phe Asp His Pro Thr  
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 Ser Thr Ala Leu Ala Ala Tyr Leu Gly Ala Arg Leu Gly Ile Asp Gly  
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 Ala Pro Ala Gly Ser Thr Leu Leu Glu Asp Leu Ala Arg Leu Glu Ser  
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 Arg Trp Asp Gln Ala Asp Gly Glu Asp Gln Ala Ala Ala Arg Glu Glu  
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 Phe Gly Arg Ser  
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 35 40 45  
 Val Arg Ser Pro Glu Glu Phe Trp Asn Leu Leu Asp Glu Gly Val Asp  
 50 55 60  
 Ala Val Ala Gly Phe Pro Glu Asp Arg Gly Trp Asp Leu Glu Asn Leu  
 65 70 75 80  
 Tyr Asp Pro Asp Pro Asp Glu Pro Gly Lys Cys Tyr Ala Arg Glu Gly  
 85 90 95  
 Gly Phe Leu Tyr Asp Ala Gly Glu Phe Asp Ala Ala Phe Phe Gly Ile  
 100 105 110  
 Ser Pro Arg Glu Ala Leu Ser Met Asp Pro Gln Gln Arg Leu Leu Leu  
 115 120 125  
 Glu Cys Ser Trp Ser Ala Leu Glu Arg Ala Gly Ile Asp Pro Gly Ser  
 130 135 140  
 Leu Arg Gly Lys Asp Val Gly Val Tyr Val Gly Ala Trp Asn Ser Asn  
 59

145		150		155		160
Tyr Gly Arg Gly	Gly 165	Gly Ala Glu Ser	Ser 170	Glu Gly His Leu	Leu 175	Thr
Gly Asn Ala Ser	Ser 180	Val Val Ser	Gly 185	Arg Val Ala Tyr	Val 190	Leu Gly
Leu Glu Gly	Pro 195	Ala Val Thr	Ile 200	Asp Thr Ala Cys	Ser 205	Ser Ser Leu
Val Gly Leu His	Leu 210	Ala 215	Gln Ala Leu Arg	Ser 220	Gly Glu Cys Gly	
Leu Ala Leu Ala	Gly 225	Gly 230	Val Thr Val Met	Ser 235	Thr Pro Leu Ser	Leu 240
Val Ser Phe Ser	Arg 245	Gln Arg Gly Leu	Ala 250	Gln Asp Gly Arg	Ser 255	Lys
Ala Phe Ser	Ala 260	Asp Ala Asp Gly	Met 265	Gly Met Ala Glu	Gly 270	Val Gly
Val Leu Val	Leu 275	Glu Arg Leu Ser	Glu 280	Ala Arg Arg Asn	Gly 285	His Glu
Val Leu Ala Val	Leu 290	Arg Ser 295	Ser Ala Val Asn	Gln 300	Asp Gly Ala Ser	
Asn Gly Leu Ser	Ala 305	Pro 310	Asn Gly Pro Ala	Gln 315	Gln Arg Val Ile	Gln 320
Ser Ala Leu Thr	Val 325	Gly Arg Leu Ala	Pro 330	Ser Asp Ile Asp	Val 335	Val
Glu Ala His	Gly 340	Thr Gly Thr Ala	Leu 345	Gly Asp Pro Ile	Glu 350	Ala Gln
Ala Leu Leu	Ala 355	Thr Tyr Gly Arg	Gly 360	Arg Asp Ala Asp	Arg 365	Pro Leu
Trp Leu Gly	Ser 370	Val Lys Ser 375	Asn Ile Gly His	Thr 380	Gln Ala Ala Ala	
Gly Val Ala Gly	Val 385	Ile 390	Lys Met Val Leu	Ala 395	Leu Arg Lys Gly	Val 400
Leu Pro Arg Thr	Leu 405	His Val Asp Glu	Pro 410	Thr Gly Glu Val	Asp 415	Trp
Asp Ser Gly	Ala 420	Val Arg Leu Leu	Thr 425	Glu Ala Arg Glu	Trp 430	Pro Ser
Gly Glu Gly	Arg 435	Val Arg Arg Ala	Gly 440	Val Ser Ser Phe	Gly 445	Ile Ser
Gly Thr Asn	Ala 450	His Val Ile 455	Val Glu Glu Ala	Pro 460	Glu Glu Glu Pro	
Arg Pro Glu	Ala 465	Pro 470	Ser Val Asp Val	Val 475	Pro Trp Val Leu	Ser Ala 480
Arg Ser Ala	Glu 485	Ala 490	Leu Arg Glu Gln	Ala 495	Ala Arg Leu Ala	Ser Val 495
Ala Gly Gly	Leu 500	Asn Val Val Asp	Val 505	Gly Trp Ser Leu	Ala 510	Ser Thr

Arg Ala Ala Phe Glu His Arg Ala Val Val Val Gly Arg Asp Ser Glu  
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 Glu Leu Val Ser Gly Leu Ser Ser Val Ser Gly Val Glu Val Gly Val  
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 Gly Val Gly Ala Gly Gly Gly Val Val Leu Val Phe Ala Gly Gln Gly  
 545 550 555 560  
 Cys Gln Trp Val Gly Met Gly Arg Glu Leu Leu Gly Ser Ser Leu Val  
 565 570 575  
 Phe Ala Glu Ser Met Arg Glu Cys Ala Ala Ala Leu Ser Pro Phe Val  
 580 585 590  
 Asp Phe Ser Val Val Asp Val Leu Gly Ser Ala Gly Glu Leu Gly Arg  
 595 600 605  
 Val Glu Val Val Gln Pro Ala Leu Trp Ala Val Met Val Ser Leu Ala  
 610 615 620  
 Arg Val Trp Arg Ser Trp Gly Val Pro Val Ala Ala Val Val Gly His  
 625 630 635 640  
 Ser Gln Gly Glu Ile Ala Ala Ala Thr Val Ala Gly Ala Leu Ser Val  
 645 650 655  
 Gly Asp Ala Ala Arg Val Val Ala Leu Arg Ser Arg Leu Ile Ala Glu  
 660 665 670  
 Arg Leu Ser Gly Leu Gly Gly Met Val Ser Val Ala Leu Ser Arg Glu  
 675 680 685  
 Arg Val Val Ser Leu Ile Ala Gly Val Pro Gly Val Ser Val Ala Ala  
 690 695 700  
 Val Asn Gly Ser Ser Ser Thr Val Val Ser Gly Glu Ala Ala Gly Leu  
 705 710 715 720  
 Glu Arg Val Leu Ala Ala Cys Val Ser Ser Gly Val Arg Ala Arg Arg  
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 Ile Asp Val Asp Tyr Ala Ser His Ser Val Gln Val Glu Leu Ile Arg  
 740 745 750  
 Glu Glu Leu Leu Gly Val Leu Asp Gly Ile Val Pro Arg Ser Gly Glu  
 755 760 765  
 Ile Pro Phe Val Ser Thr Val Thr Gly Glu Arg Ile Asp Thr Val Glu  
 770 775 780  
 Leu Gly Ala Glu Tyr Trp Tyr Arg Asn Leu Arg Gln Thr Val Glu Phe  
 785 790 795 800  
 Gln Ala Ser Val Gln Thr Leu Leu Ala Gln Gly His Gln Val Phe Leu  
 805 810 815  
 Glu Ser Ser Pro His Pro Val Leu Thr Val Gly Ile Glu Glu Thr Val  
 820 825 830  
 His Glu Ser Ala Ala Gln Ala Val Val Leu Gly Ser Leu Arg Arg Asp  
 835 840 845  
 Glu Gly Ala Leu Thr Arg Leu Val Thr Ser Ala Gly Glu Ala Trp Ala  
 850 855 860  
 Arg Gly Val Pro Val Asp Trp Ala Gly Met Leu Ala Gly Gly Arg Arg  
 865 870 875 880

Val Glu Leu Pro Thr Tyr Pro Phe Leu Arg Glu Arg Leu Trp Leu Glu  
 885 890 895  
 Pro Ser Arg Ser Arg Thr Gly Asn Leu Asn Met Ala Gly Leu Val Glu  
 900 905 910  
 Ala Gly His Glu Ile Leu Pro Ala Ala Val Glu Leu Pro Gly Glu Gln  
 915 920 925  
 Trp Val Trp Thr Gly Glu Leu Ser Leu Ser Ala Tyr Pro Trp Leu Ala  
 930 935 940  
 Asp His Gln Val Leu Gly Gln Thr Leu Val Pro Gly Val Ala Trp Val  
 945 950 955 960  
 Glu Leu Ala Leu His Ala Gly His Gln Leu Gly Phe Gly Ser Val Glu  
 965 970 975  
 Glu Leu Thr Leu Gln Ala Pro Leu Val Leu Gly Glu Ser Asp Ala Val  
 980 985 990  
 Gln Val Arg Val Val Val Ser Asp Leu Gly Glu Ser Asp Arg Arg Ala  
 995 1000 1005  
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 1010 1015 1020  
 Glu Gly Phe Leu Thr Ala Lys Gly Ala Gln Pro Glu Thr Met Ala Val  
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 1045 1050 1055  
 Arg Leu Ala Asp Ala Gly Tyr His Tyr Gly Pro Val Phe Gln Gly Val  
 1060 1065 1070  
 Ser Lys Val Trp Arg Ala Gly Glu Ile Tyr Ala Glu Val Gly Leu  
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 Leu Asp Asp Ala Asp Val Asp Gly Phe Gly Ile His Pro Ala Leu Leu  
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 Asp Ala Ala Leu Gln Thr Ala Tyr Val Ala Gln Arg Gly Pro Ala Glu  
 1105 1110 1115 1120  
 Thr Lys Leu Pro Phe Ala Phe Gly Asp Val Gln Leu Phe Ala Thr Gly  
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 Ala Arg Ser Leu Arg Val Arg Val Ser Pro Ala Ala Gln Gln Gly Met  
 1140 1145 1150  
 Ala Trp Glu Ala Trp Asp Pro Thr Gly Leu Pro Val Phe Ser Leu Gly  
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 Tyr Leu Ala Thr Arg Pro Val Asp Arg Gly Gln Leu Thr Val Lys Arg  
 1170 1175 1180  
 Pro Glu Ser Leu Phe Lys Val Ala Trp Asp Glu Thr Val Pro Val Val  
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 Ala Leu Gly Ala Ala Leu Arg Ala Ala Gly Trp Glu Val Gly Ala Ala  
 1220 1225 1230  
 Pro Glu Pro Ala Ser Ala Asp Thr Ala Ala Glu Val Leu Leu Leu Pro  
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1235	1240	1245
Cys Thr Ala Pro Gly Glu Pro Asp Ala Asp Leu Pro Thr Ala Val Arg 1250 1255 1260		
Ala Val Thr Ala Arg Val Leu Gly Val Leu Gln Glu Trp Leu Ala Asp 1265 1270 1275 1280		
Glu Arg Leu Ala Gly Thr Arg Leu Ala Val Val Thr Arg Asn Ala Leu 1285 1290 1295		
Pro Gly Asp Leu Leu His Ser Pro Val Trp Gly Leu Val Arg Ser Ala 1300 1305 1310		
Gln Thr Glu Asn Pro Gly Arg Ile Thr Leu Val Asp Leu Asp Asp His 1315 1320 1325		
Pro Asp Ser Ala Ala Val Leu Ala Glu Ala Val Gln Ser Asp Glu Pro 1330 1335 1340		
Arg Ile Met Val Arg Glu Gly Arg Pro Thr Ala Ala Arg Leu Val Arg 1345 1350 1355 1360		
Ala Thr Ala Pro Glu Leu Val Pro Pro Ala Gly Ala Asp Ala Trp Arg 1365 1370 1375		
Leu Glu Ile Thr Glu Pro Gly Thr Phe Asp Asn Leu Thr Leu Gly Val 1380 1385 1390		
Tyr Pro His Ala Glu Lys Thr Leu Ala Asp Asn Glu Val Arg Val Ala 1395 1400 1405		
Val His Ala Gly Gly Leu Asn Phe His Asp Val Val Ala Ala Leu Gly 1410 1415 1420		
Met Val Glu Asp Asp Leu Thr Leu Gly Arg Glu Ala Ala Gly Val Val 1425 1430 1435 1440		
Val Glu Val Gly Asp Ala Val Pro Asp Leu Thr Pro Gly Asp His Val 1445 1450 1455		
Met Gly Ile Leu Ser Ser Gly Phe Gly Pro Leu Ala Val Thr Asp His 1460 1465 1470		
Arg Tyr Leu Ala Arg Met Pro Glu Gly Trp Thr Phe Ala Gln Ala Ala 1475 1480 1485		
Ser Val Pro Ala Ala Phe Leu Thr Ala Tyr Tyr Gly Leu Cys Asp Leu 1490 1495 1500		
Gly Gly Ile Arg Ala Gly Asp Arg Val Leu Ile His Ala Ala Ala Gly 1505 1510 1515 1520		
Gly Val Gly Met Ala Ala Val Gln Ile Ala Arg His Leu Gly Ala Glu 1525 1530 1535		
Val Phe Gly Thr Ala Ser Pro Arg Lys Trp Gly Ala Leu Arg Ala Leu 1540 1545 1550		
Gly Leu Asp Asp Ala His Leu Ser Ser Arg Thr Leu Asp Phe Glu 1555 1560 1565		
Gln Glu Phe Leu Asp Ala Thr Asp Gly Arg Gly Val Asp Leu Val Leu 1570 1575 1580		
Asn Ser Leu Ala Arg Glu Phe Val Asp Ala Ser Leu Arg Leu Met Pro 1585 1590 1595 1600		

Gly Gly Gly Arg Phe Val Asp Met Gly Lys Thr Asp Ile Arg Arg Pro  
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 Glu Gln Val Ala Glu Asp His Gly Gly Val Ala Tyr Gln Ala Phe Asp  
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 Leu Val Glu Ala Gly Pro Gln Arg Thr Gly Glu Met Leu Ala Glu Ile  
 1635 1640 1645  
 Val Arg Leu Phe Gln Ala Gly Ala Phe Arg Pro Leu Pro Ile Thr Gln  
 1650 1655 1660  
 Trp Asp Val Arg Arg Ala Pro Glu Ala Phe Arg His Ile Ser Gln Ala  
 1665 1670 1675 1680  
 Lys His Ile Gly Lys Ile Val Leu Thr Val Pro Arg Pro Ile Asp Thr  
 1685 1690 1695  
 Asp Gly Thr Val Met Val Thr Gly Ala Thr Gly Thr Leu Gly Gly Phe  
 1700 1705 1710  
 Val Ala Arg His Leu Val Thr His His Gly Ile Arg Arg Leu Leu Leu  
 1715 1720 1725  
 Val Ser Arg Ser Ala Glu Arg Thr Asp Leu Val Arg Glu Leu Thr Glu  
 1730 1735 1740  
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 1745 1750 1755 1760  
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 1765 1770 1775  
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 1780 1785 1790  
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 1795 1800 1805  
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 Val Leu Phe Ser Ser Ala Ser Gly Val Leu Gly Gly Ala Gly Gln Ser  
 1825 1830 1835 1840  
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 Arg Ala Gln Gly Leu Ala Gly Gln Ala Leu Ala Trp Gly Leu Trp Ser  
 1860 1865 1870  
 Asp Arg Ser Thr Met Thr Gly Gln Leu Gly Ser Thr Glu Leu Ala Arg  
 1875 1880 1885  
 Ile Ala Arg Asn Gly Val Ala Glu Met Ser Glu Thr Glu Gly Leu Ala  
 1890 1895 1900  
 Leu Phe Asp Ala Ala Arg Asp Thr Ala Glu Ala Val Leu Leu Pro Met  
 1905 1910 1915 1920  
 His Leu Asp Val Ala Arg Leu Arg Ser Arg Asn Gly Glu Val Pro Ala  
 1925 1930 1935  
 Val Phe Arg Arg Leu Ile His Ala Thr Ala Arg Arg Thr Ala Ser Thr  
 1940 1945 1950  
 Ala Val Arg Ser Ala Gly Leu Glu Gln Gln Leu Ala Ser Leu Ser Gly  
 1955 1960 1965



Pro Glu Arg Thr Glu Leu Leu Leu Gly Leu Val Arg Asp His Ala Ala  
 1970 1975 1980  
 Ala Val Leu Gly His Gly Thr Ser Asp Ala Val Ser Pro Asp Arg Pro  
 1985 1990 1995 2000  
 Phe Arg Asp Leu Gly Phe Asp Ser Leu Thr Ala Val Glu Leu Arg Asn  
 2005 2010 2015  
 Arg Phe Ala Ala Leu Thr Gly Leu Arg Leu Pro Ala Thr Leu Val Phe  
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 Asp His Pro Ser Pro Thr Ala Leu Ala Gly His Leu Ala Gly Leu Leu  
 2035 2040 2045  
 Gly Ala Ala Thr Pro Ser Ala Ala Glu Pro Val Leu Ala Ala Val Gly  
 2050 2055 2060  
 Arg Leu Arg Ala Asp Leu Arg Ser Leu Thr Pro Asp Ala Glu Gly Ala  
 2065 2070 2075 2080  
 Glu Asp Val Thr Ile Gln Leu Glu Ala Leu Leu Ala Glu Trp Arg Glu  
 2085 2090 2095  
 Ala Ala Glu Lys Arg Ala Pro Glu Ala Val Gly Asp Glu Asp Leu Ser  
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 Thr Ala Thr Asp Asp Glu Ile Phe Ala Leu Val Asp Ser Glu Leu Gly  
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 Thr Leu Ala Asp Leu Arg Thr Thr Lys Gln Arg Leu Arg Asp Thr Glu  
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 Arg Arg Ala Thr Glu Pro Val Ala Ile Val Gly Met Ser Cys Arg Leu  
 35 40 45  
 Pro Gly Asp Val Arg Thr Pro Glu Arg Phe Trp Glu Leu Leu Asp Thr  
 50 55 60  
 Gly Thr Asp Ala Leu Thr Pro Leu Pro Thr Asp Arg Gly Trp Asn Leu  
 65 70 75 80  
 Asp Thr Ala Phe Asp Asp Glu Arg Pro Tyr Arg Arg Glu Gly Gly Phe  
 85 90 95  
 Leu Tyr Asp Ala Gly Arg Phe Asp Ala Glu Phe Phe Gly Ile Ser Pro  
 100 105 110  
 Arg Glu Ala Leu Ala Met Asp Pro Gln Gln Arg Leu Leu Leu Glu Ser  
 115 120 125  
 Ser Trp Glu Ala Ile Glu His Ala Arg Ile Asp Pro Arg Ser Leu His  
 130 135 140  
 Gly Ser Arg Thr Gly Val Trp Phe Gly Thr Ile Gly Gln Asp Tyr Phe  
 65

145		150		155		160									
Ser	Leu	Phe	Ala	Ala	Ser	Gly	Gly	Glu	His	Ala	Asn	Tyr	Leu	Ala	Thr
			165						170					175	
Ala	Cys	Ser	Ala	Ser	Val	Met	Ser	Gly	Arg	Val	Ser	Tyr	Val	Leu	Gly
			180					185					190		
Leu	Glu	Gly	Pro	Ala	Val	Thr	Val	Asp	Thr	Ala	Cys	Ser	Ser	Ser	Leu
		195					200					205			
Val	Ala	Leu	His	Ser	Ala	Val	Gln	Ala	Leu	Arg	Ser	Gly	Glu	Cys	Glu
	210					215					220				
Leu	Ala	Leu	Ala	Gly	Gly	Ala	Thr	Val	Met	Ala	Thr	Pro	Thr	Val	Phe
225				230						235					240
Thr	Ala	Phe	Ser	His	Gln	Arg	Gly	Leu	Ala	Gly	Asp	Gly	Arg	Cys	Lys
				245					250					255	
Ala	Phe	Ala	Ala	Gly	Ala	Asp	Gly	Ala	Gly	Phe	Ala	Glu	Gly	Val	Gly
			260					265					270		
Val	Leu	Val	Leu	Glu	Arg	Leu	Ser	Val	Ala	Arg	Arg	Asn	Gly	His	Arg
		275					280					285			
Val	Leu	Ala	Val	Val	Arg	Gly	Ser	Ala	Val	Asn	Gln	Asp	Gly	Ala	Ser
	290					295					300				
Asn	Gly	Leu	Thr	Ala	Pro	Asn	Gly	Pro	Ser	Gln	Gln	Arg	Val	Ile	Arg
305					310					315					320
Ala	Ala	Leu	Ala	Asn	Ala	Arg	Leu	Ala	Pro	Glu	Asp	Val	Asp	Ala	Val
				325					330					335	
Glu	Gly	His	Gly	Thr	Gly	Thr	Ser	Leu	Gly	Asp	Pro	Ile	Glu	Ala	Gln
			340					345					350		
Ala	Leu	Leu	Ala	Thr	Tyr	Gly	Arg	Gly	Arg	Asp	Ala	Glu	Arg	Pro	Leu
		355					360					365			
Trp	Leu	Gly	Ser	Val	Lys	Ser	Asn	Ile	Gly	His	Ala	Gln	Ala	Ala	Ala
	370					375					380				
Gly	Val	Ala	Gly	Val	Ile	Lys	Met	Val	Leu	Ala	Met	Glu	Lys	Gly	Arg
385					390					395					400
Leu	Pro	Arg	Thr	Leu	His	Val	Asp	Glu	Pro	Ser	Gly	Glu	Val	Asp	Trp
				405					410					415	
Asp	Ser	Gly	Ala	Val	Arg	Leu	Leu	Thr	Glu	Ala	Arg	Asp	Trp	Pro	Ser
			420					425					430		
Gly	Glu	Gly	Arg	Val	Arg	Arg	Ala	Gly	Val	Ser	Ser	Phe	Gly	Ile	Ser
		435					440					445			
Gly	Thr	Asn	Ala	His	Val	Ile	Ile	Glu	Glu	Pro	Gln	Glu	Glu	Glu	Ala
	450					455					460				
Ala	Pro	Asp	Ser	Ser	Ala	Ser	Gly	Ala	Val	Pro	Trp	Val	Leu	Ser	Ala
465					470					475					480
Arg	Ser	Ala	Glu	Ala	Leu	Gln	Ala	Leu	Ala	Ser	Gln	Leu	Ala	Asp	His
				485					490					495	
Ser	Ala	Lys	Ser	Ser	Pro	Val	Asp	Val	Gly	Trp	Ser	Leu	Val	Ser	Thr
			500					505					510		

Arg Ala Ala Phe Glu His Arg Ala Val Val Val Gly Arg Gly Arg Asp  
 515 520 525  
 Glu Leu Val Arg Gly Leu Ser Glu Val Ala Gln Gly Arg Gly Val Arg  
 530 535 540  
 Gly Val Ala Ser Ser Ala Ser Gly Gly Leu Ala Phe Val Phe Ala Gly  
 545 550 555 560  
 Gln Gly Ser Gln Arg Leu Gly Met Gly Arg Gly Leu Tyr Glu Arg Phe  
 565 570 575  
 Pro Val Phe Ala Glu Ala Phe Asp Glu Val Cys Gly Arg Val Gly Pro  
 580 585 590  
 Gly Val Arg Glu Val Val Phe Gly Ser Asp Ala Gly Glu Leu Asp Arg  
 595 600 605  
 Thr Val Trp Ala Gln Ala Gly Leu Phe Ala Leu Glu Val Ala Leu Phe  
 610 615 620  
 Arg Leu Leu Glu Ser Trp Gly Val Arg Pro Gly Cys Leu Ile Gly His  
 625 630 635 640  
 Ser Val Gly Glu Leu Ser Ala Ala Cys Val Ala Gly Leu Trp Ser Leu  
 645 650 655  
 Glu Asp Ala Cys Arg Val Val Ala Ala Arg Ala Arg Leu Met Gln Ala  
 660 665 670  
 Leu Pro Ala Gly Gly Val Met Val Ala Val Arg Ala Glu Ala Gly Glu  
 675 680 685  
 Leu Ala Gly Phe Leu Gly Glu Asp Val Val Ile Ala Ser Val Asn Ala  
 690 695 700  
 Pro Gly Gln Val Val Ile Ala Gly Pro Glu Gly Gly Val Glu Arg Val  
 705 710 715 720  
 Val Ala Ala Cys Gly Ala Arg Ser Arg Arg Leu Ala Val Ser His Ala  
 725 730 735  
 Phe His Ser Pro Leu Val Glu Pro Met Leu Gly Glu Phe Arg Arg Val  
 740 745 750  
 Val Glu Ser Val Ala Phe Gly Val Pro Ser Leu Arg Val Val Ser Asn  
 755 760 765  
 Val Thr Gly Ala Trp Val Asp Pro Glu Glu Trp Gly Thr Pro Glu Tyr  
 770 775 780  
 Trp Val Arg Gln Val Arg Glu Pro Val Arg Phe Ala Asp Gly Val Ala  
 785 790 795 800  
 Thr Leu Leu Asp Ala Gly Val Arg Thr Phe Val Glu Leu Gly Pro Ala  
 805 810 815  
 Gly Thr Leu Thr Ser Met Val Ser His Cys Ala Asp Ala Thr Ala Thr  
 820 825 830  
 Ser Val Thr Ala Val Pro Thr Leu Arg Pro Asp His Asp Glu Ser Arg  
 835 840 845  
 Thr Val Leu Ser Ala Ala Ala Ser Leu Tyr Val Gln Gly His Pro Val  
 850 855 860  
 Asp Trp Ala Pro Leu Phe Pro Arg Ala Arg Thr Val Asp Leu Pro Thr  
 865 870 875 880

Tyr Pro Phe Gln His Gln His Tyr Trp Met Glu Ser Ala Ala Arg Pro  
 885 890 895  
 Thr Val Glu Asp Thr Pro Arg Glu Pro Leu Asp Gly Trp Thr His Arg  
 900 905 910  
 Ile Asp Trp Val Pro Leu Val Asp Glu Glu Pro Ala Pro Val Leu Ala  
 915 920 925  
 Gly Thr Trp Leu Leu Val Arg Pro Glu Glu Gly Pro Arg Pro Leu Ala  
 930 935 940  
 Asp Ala Val Ala Asp Ala Leu Thr Arg His Gly Ala Ser Val Val Glu  
 945 950 955 960  
 Ala Ala Arg Val Pro His Gln Ser Asp Thr Glu Leu Thr Gly Val Val  
 965 970 975  
 Ser Leu Leu Gly Pro Gly Ala Asp Gly Asp Gly Gly Leu Asp Ala Thr  
 980 985 990  
 Leu Arg Leu Val Gln Asp Leu Ala Thr Ala Gly Ser Thr Ala Pro Leu  
 995 1000 1005  
 Trp Ile Val Thr Ser Gly Ala Val Ala Val Gly Thr Ser Asp Thr Val  
 1010 1015 1020  
 Pro Asn Pro Glu Gln Ala Thr Leu Trp Gly Leu Ala Arg Ala Ala Ala  
 1025 1030 1035 1040  
 Thr Glu Trp Pro Gly Leu Gly Ala Ala Arg Ile Asp Leu Pro Ala Asp  
 1045 1050 1055  
 Leu Thr Glu Gln Val Gly Arg Arg Leu Cys Ala Arg Leu Leu Asp Arg  
 1060 1065 1070  
 Ser Glu Gln Glu Thr Ala Val Arg Gln Ala Gly Val Phe Ala Arg Arg  
 1075 1080 1085  
 Leu Val Arg Ala Arg Thr Ser Asp Gly Arg Trp Thr Pro Arg Gly Thr  
 1090 1095 1100  
 Val Leu Val Thr Gly Gly Thr Gly Ala Leu Ala Gly His Val Ala Arg  
 1105 1110 1115 1120  
 Trp Leu Ala Glu Glu Gly Ala Glu His Ile Val Leu Ala Gly Arg Arg  
 1125 1130 1135  
 Gly Pro Asp Gly Gln Gly Ala Glu Ala Leu Arg Ala Asp Leu Val Ala  
 1140 1145 1150  
 Ala Gly Val Lys Ala Thr Ile Val Arg Cys Asp Val Ala Asp Arg Asp  
 1155 1160 1165  
 Ala Val Arg Leu Leu Leu Asp Ala His Arg Pro Ser Ala Ile Val His  
 1170 1175 1180  
 Thr Ala Gly Val Val Asp Asp Gly Leu Leu Thr Ser Leu Thr Pro Ala  
 1185 1190 1195 1200  
 Gln Val Glu Arg Val Leu Arg Pro Lys Leu Leu Gly Ala Arg Asn Leu  
 1205 1210 1215  
 His Glu Leu Thr Arg Asp Arg Glu Leu Asp Ala Phe Val Leu Phe Ser  
 1220 1225 1230  
 Ser Leu Ala Gly Val Leu Gly Gly Ala Gly Gln Ala Asn Tyr Ala Ala  
 68

1235	1240	1245
Ala Asn Ala Tyr Leu Asp Ala	Leu Ala Ala His Arg Thr Ala His Gly	
1250	1255	1260
Leu Pro Ala Ala Ser Leu Ala Trp Gly Pro Trp Glu Gly Asp Gly Met		
1265	1270	1275
Ala Ala Ala Gln Glu Ala Ala Asp Arg Leu Arg Arg Ser Gly Leu Thr		
1285	1290	1295
Pro Leu Pro Pro Glu Gln Ala Val Arg Ala Leu Gly Arg Gly His Gly		
1300	1305	1310
Pro Leu Val Val Ala Asp Ala Asp Trp Ala Arg Leu Ala Ala Gly Ser		
1315	1320	1325
Thr Gln Arg Leu Leu Asp Glu Leu Pro Glu Val Arg Ala Val Arg Pro		
1330	1335	1340
Ala Glu Pro Ala Val Gly Gln Arg Pro Asp Leu Pro Ala Arg Leu Ala		
1345	1350	1355
Gly Arg Pro Ala Glu Glu Gln Ser Ala Val Leu Leu Glu Ala Val Arg		
1365	1370	1375
Glu Glu Ile Ala Ala Val Leu Arg Tyr Ala Asp Pro Ala Arg Ile Gly		
1380	1385	1390
Ala Asp His Glu Phe Leu Ala Leu Gly Phe Asp Ser Leu Thr Ser Ile		
1395	1400	1405
Glu Leu Arg Asn Arg Leu Ala Thr Arg Ile Gly Leu Thr Leu Pro Ala		
1410	1415	1420
Thr Leu Thr Leu Glu Gln Arg Thr Pro Ala Gly Leu Ala Ala His Leu		
1425	1430	1435
Arg Glu Arg Ile Ala Asp Arg Pro Val Gly Ser Gly Ala Val Pro Val		
1445	1450	1455
Pro Gly Ser Ala Asp Val Pro Glu Ala Gly Gly Gly Ser Gly Leu Gly		
1460	1465	1470
Glu Leu Trp Gln Glu Ala Asp Arg His Gly Arg Arg Leu Glu Phe Ile		
1475	1480	1485
Asp Val Leu Thr Ala Ala Ala Ala Phe Arg Pro Ala Tyr Arg Glu Pro		
1490	1495	1500
Ala Glu Leu Glu Leu Pro Pro Leu Arg Leu Thr Ser Gly Gly Asp Glu		
1505	1510	1515
Pro Pro Leu Phe Cys Ile Pro Ser His Leu Gly Lys Ala Asp Pro His		
1525	1530	1535
Lys Phe Leu Arg Phe Ala Ala Ala Leu Arg Gly Arg Arg Asp Val Phe		
1540	1545	1550
Val Leu Arg Gln Pro Gly Phe Val Pro Gly Gln Pro Leu Pro Ala Gly		
1555	1560	1565
Leu Asp Val Leu Leu Asp Thr His Ala Arg Ala Met Ala Gly His Asp		
1570	1575	1580
Arg Pro Val Leu Leu Gly Tyr Ser Ala Gly Gly Leu Ala Ala Gln Ala		
1585	1590	1595
		1600

Leu Ala Ala Arg Leu Ala Glu Leu Gly Arg Pro Pro Ala Ala Val Val  
 1605 1610 1615  
 Leu Val Asp Thr Tyr Ala Pro Asp Glu Thr Glu Val Met Ala Arg Ile  
 1620 1625 1630  
 Gln Gly Ala Met Glu Gln Gly Gln Arg Asp Arg Asp Gly Arg Thr Gly  
 1635 1640 1645  
 Ala Ala Phe Gly Glu Ala Trp Leu Thr Ala Met Gly His Tyr Phe Gly  
 1650 1655 1660  
 Phe Asp Trp Thr Pro Cys Pro Val Asp Val Pro Val Leu His Val Arg  
 1665 1670 1675 1680  
 Ala Gly Asp Pro Met Thr Gly Met Pro Val Glu Gly Arg Trp Gln Ala  
 1685 1690 1695  
 Arg Trp Asn Leu Pro His Thr Ala Val Asp Val Pro Gly Asp His Phe  
 1700 1705 1710  
 Thr Met Met Glu Asp His Ala Pro Arg Thr Ala Asp Thr Val His Asp  
 1715 1720 1725  
 Trp Leu Gly Thr Ala Val Arg Arg Pro Glu Arg Thr Arg Asp  
 1730 1735 1740

<210> 8  
 <211> 264  
 <212> PRT  
 <213> Streptomyces parvulus Tu4055

<400> 8  
 Met Thr Gly Thr Asn Thr His Ser Asp Val Trp Ile Arg Gln Tyr Arg  
 1 5 10 15  
 Pro Ala His Pro Thr Ala Pro Gln Leu Ile Cys Leu Pro His Ala Gly  
 20 25 30  
 Gly Ser Ala Thr Phe Tyr His Pro Val Ala Ala Ala Leu Ala Pro Arg  
 35 40 45  
 Cys Asp Val Leu Ala Val Gln Tyr Pro Gly Arg Gln Asp Arg Arg Ala  
 50 55 60  
 Glu Lys Pro Leu Glu Asp Ile Asp Glu Leu Ala Asn Gln Leu Phe Pro  
 65 70 75 80  
 Val Leu Arg Ala Arg Val His Gln Pro Val Ala Leu Phe Gly His Ser  
 85 90 95  
 Met Gly Ala Thr Leu Ala Phe Glu Leu Ala Arg Arg Phe Glu Ser Ala  
 100 105 110  
 Gly Ile Ser Leu Glu Ala Leu Leu Val Ser Ala Arg Pro Ala Pro Ser  
 115 120 125  
 Arg Gln Arg Thr Gly Gly Thr Val His Leu Leu Ser Asp Glu Glu Leu  
 130 135 140  
 Val Ala Glu Leu Arg Thr Leu Asp Gly Thr Ala Glu Gln Val Phe His  
 145 150 155 160  
 Asp Glu Glu Leu Val Arg Met Ala Leu Pro Ala Ile Arg Gly Asp Tyr  
 165 170 175  
 Arg Ala Ala Glu Thr Tyr Arg Tyr Arg Pro Gly Pro Lys Leu Arg Cys  
 180 185 190

Pro Ile His Ala Leu Thr Gly Asp Asp Asp Pro Met Val Thr Pro Val  
195 200 205  
Glu Ala Arg Ala Trp Ser Glu His Thr Asp Gly Pro Phe Thr Leu Asp  
210 215 220  
Thr Phe Ala Gly Gly His Phe Tyr Leu Leu Glu His Arg Asp Ala Ile  
225 230 235 240  
Leu Gly Ile Ile Ala Glu His Leu Arg Thr Cys Ser Arg Ala Pro Gly  
245 250 255  
Asp Arg Ser Gly Leu Thr Arg Glu  
260

<210> 9  
<211> 265  
<212> PRT  
<213> Streptomyces parvulus Tu4055

<400> 9  
Met Ser Leu Glu Leu Thr Asp Arg Val Met Met Val Thr Gly Ala Gly  
1 5 10 15  
Ser Gly Ile Gly Arg Ala Ala Ala Arg Leu Leu Val Gly His Gly Ala  
20 25 30  
Arg Val Val Leu Val Gly Arg Thr Glu Ser Ala Leu Thr Glu Thr Thr  
35 40 45  
Ala Gly Leu Pro Ser Ser His His Leu Val Val Pro Cys Asp Val Gly  
50 55 60  
Asp Asp Lys Gln Val Ala Asp Cys Val Ala Arg Ala Val Ser Arg Phe  
65 70 75 80  
Gly Arg Leu Asp Gly Ala Phe Asn Asn Ala Gly Thr Phe Gly Ser Phe  
85 90 95  
Gly Pro Leu His Gln Asp Thr Ala Asp Asn Phe Asp Arg Val Ile Ala  
100 105 110  
Thr Asn Leu Arg Gly Val Trp Ser Cys Met Arg Gly Gln Ile Glu Ala  
115 120 125  
Met Leu Thr Ala Gly Gly Gly Ala Ile Val Asn Cys Ala Ser Val Ala  
130 135 140  
Gly His Ile Gly His Ala Gln Ser Pro Leu Tyr Ser Ala Thr Lys His  
145 150 155 160  
Ala Val Ile Gly Leu Ser Lys Ser Val Ala Leu Gln Tyr Ala Gly Asp  
165 170 175  
Gly Ile Arg Val Asn Val Val Ser Pro Gly Ser Thr Asp Thr Pro Met  
180 185 190  
Leu Arg Ser Leu Tyr Ala Asp Pro Ser Ala Leu Ala Gln Arg Ala Arg  
195 200 205  
Arg Ala Pro Leu Gly Arg Leu Gly Lys Cys Glu Glu Val Ala Asn Ala  
210 215 220  
Val Val Trp Leu Leu Ser Pro Leu Ala Ala Tyr Val Thr Gly Gln Thr  
225 230 235 240  
Leu Gly Val Asp Gly Gly Val Thr Ala Gly Ser Ala Ile Pro Arg Thr  
71

245 250 255  
 Asn Ala Thr Pro Glu Gly Gln His Arg  
 260 265  
 <210> 10  
 <211> 250  
 <212> PRT  
 <213> Streptomyces parvulus Tu4055  
 <400> 10  
 Met Thr Ala Arg His Asp Val Ala Leu Val Thr Gly Ala Gly Ser Gly  
 1 5 10 15  
 Ile Cys Ala Glu Val Ala Arg Gly Leu Ala Ala Arg Gly Leu Arg Val  
 20 25 30  
 Val Leu Leu Asp Lys Asp Ala Glu Ala Val His Arg Val Ala Asp Gly  
 35 40 45  
 Leu Gly Asp Arg Leu Ala Arg Asp Pro Leu Val Ala Asp Val Thr Asp  
 50 55 60  
 Pro His Ala Leu Ala Ser Ala Val Asp Ser Leu Ala Pro Gln His Arg  
 65 70 75 80  
 Pro Gly Val Leu Val Asn Gly Val Gly Gly Asp Thr Arg Ala Arg Ser  
 85 90 95  
 Val Thr Glu Leu Thr Glu Ala Asp Leu Gln Glu Ala Val Thr His Asn  
 100 105 110  
 Leu Ala Ser Val Phe Thr Met Thr Arg Leu Cys Val Pro Ala Met Val  
 115 120 125  
 Ala Ala Gly Trp Gly Arg Val Val Asn Leu Ala Ser Val Ala Gly Arg  
 130 135 140  
 Thr Tyr Thr Arg Phe Ser Asn Ala Ala Tyr Val Ala Ala Lys Ala Gly  
 145 150 155 160  
 Val Ile Gly Phe Thr Lys Gln Cys Ala Tyr Glu Leu Ala Pro His Gly  
 165 170 175  
 Val Thr Val Asn Ala Val Ala His Gly Val Ile Gly Thr Glu Arg Ile  
 180 185 190  
 Arg Arg Ala Trp Glu Asp Lys Pro Pro Gln Trp Thr Ala Asp Arg Val  
 195 200 205  
 Ser His Ile Pro Ala Gly Arg Phe Gly Ser Val Ala Glu Ala Ala Gly  
 210 215 220  
 Met Val Cys His Leu Cys Gly Glu Asp Ala Gly Tyr Thr Thr Gly Thr  
 225 230 235 240  
 Val Val Asp Val Asn Gly Gly Leu His Ile  
 245 250

<210> 11  
 <211> 390  
 <212> PRT  
 <213> Streptomyces parvulus Tu4055

<400> 11  
 Met Ile Arg Arg Val Arg Leu His Thr Ala Val Val Pro Met Ala Ala  
 1 5 10 15



Ala Phe Asp His<sub>20</sub> Ala Thr Arg Ser Arg<sub>25</sub> Arg Ser Ala Ala Ser<sub>30</sub> Leu Leu  
 Val Glu Ile<sub>35</sub> Glu Leu Ala Gly Thr<sub>40</sub> Arg Gly Trp Gly<sub>45</sub> Glu Gly Ala Pro  
 Arg Asp<sub>50</sub> Tyr Val Thr Gly<sub>55</sub> Thr Leu Asp Gly<sub>60</sub> Ala Val Arg Ala Val  
 Gln Ala Cys Asp Pro Gly<sub>70</sub> Glu Leu Ala Glu Arg<sub>75</sub> Ile Glu Trp Arg Asp<sub>80</sub>  
 Phe Glu Ser Ala Val<sub>85</sub> Ala Ser Ile Ala Gln<sub>90</sub> Leu Pro Leu Thr Gly<sub>95</sub> Leu  
 Val Asp Gly Ser<sub>100</sub> Ser Ala Ala Ala<sub>105</sub> Val Glu Ile Ala<sub>110</sub> Leu Leu Asp  
 Ala Val Cys<sub>115</sub> Arg His Phe Ala Arg<sub>120</sub> Pro Leu Ala Asp Val<sub>125</sub> Leu Arg Val  
 Leu Ala<sub>130</sub> Pro Pro Ala Arg Ser<sub>135</sub> Arg Arg Asp Gly<sub>140</sub> Pro Thr Ser Val Ser  
 Leu Val<sub>145</sub> Ile His Leu Ser<sub>150</sub> Arg Asp Val Ala Thr<sub>155</sub> Val Leu Asp Ala Leu<sub>160</sub>  
 Thr Pro Arg Ala<sub>165</sub> Leu Ala Ala Leu Arg His<sub>170</sub> Val Lys Ile Lys Val<sub>175</sub> Ala  
 Asp Pro Ala Gly<sub>180</sub> Ala Val Asp Arg Leu<sub>185</sub> Thr Ala Ala Gln Asp<sub>190</sub> Arg Leu  
 Pro Ala Asp<sub>195</sub> Thr Arg Val Ser<sub>200</sub> Asp Val Asn Gly<sub>205</sub> Ala Trp Thr Ala  
 Glu Glu<sub>210</sub> Ala Glu Lys Val Ala<sub>215</sub> Gly Glu Leu Asp Gly<sub>220</sub> Val Gly Trp Val  
 Glu Glu<sub>225</sub> Pro Leu Pro Pro<sub>230</sub> Arg Ser Trp Pro Glu<sub>235</sub> Leu Gly Arg Leu Arg<sub>240</sub>  
 Arg Ala Thr Gly<sub>245</sub> Leu Pro Val Met Leu Asp<sub>250</sub> Glu Ser Cys Thr Gly<sub>255</sub> Pro  
 Ala Asp Leu His<sub>260</sub> Ala Ala Ala Thr Ser<sub>265</sub> Gly Ala Ala Ser His<sub>270</sub> Ile Asn  
 Val Arg Leu<sub>275</sub> Ser Lys Cys Gly Gly<sub>280</sub> Phe Leu Ala Ala Ala<sub>285</sub> Arg Leu Ala  
 Leu Arg<sub>290</sub> Ala Asp Glu Leu Gly<sub>295</sub> Val Gly Cys Gln Leu<sub>300</sub> Gly Val His Val  
 Ala Glu Val Gly Pro Leu<sub>310</sub> Trp Ala Ala Gly Arg<sub>315</sub> Thr Leu Ala Thr Ala<sub>320</sub>  
 Trp Asp Leu Trp Gln<sub>325</sub> Thr Val Glu Ala Gly<sub>330</sub> Arg Ala Asp Glu Trp<sub>335</sub> Phe  
 Pro Val Pro Leu<sub>340</sub> Thr Thr Pro Ala Phe<sub>345</sub> Thr Val Asp Arg Ser<sub>350</sub> Leu His  
 Arg Val Glu<sub>355</sub> Pro Leu Thr Gly Pro<sub>360</sub> Gly Thr Gly Ile Glu<sub>365</sub> Pro Thr Glu  
 Glu Leu<sub>370</sub> Leu Arg His Thr Arg<sub>375</sub> Cys Ala Ala Thr Trp<sub>380</sub> Glu Ser Gly Gly

Gly Trp Arg Arg Asn Thr  
385 390

<210> 12  
<211> 272  
<212> PRT  
<213> Streptomyces parvulus Tu4055

<400> 12  
Met Pro Thr Thr Ser Met Leu Thr Ala Ala Asp Gly Thr Gly Leu Thr  
1 5 10 15  
Leu His His Trp Thr Thr Pro Gly Ala Thr Ser Ala Val Phe Tyr Leu  
20 25 30  
His Gly Ile Gln Ser His Ala Gly Trp Leu Phe Glu Thr Gly Pro Glu  
35 40 45  
Leu Asn Ala Arg Gly Ile Asp Val Tyr Ala Leu Asp Arg Arg Gly Ser  
50 55 60  
Gly Arg Ser Glu Gly Pro Arg Gly His Leu Pro Ser Ala Asp Leu Val  
65 70 75 80  
Leu Asp Asp Tyr Ala Arg Ala Leu Asp Ala Val Thr Ala Glu Val Gly  
85 90 95  
Gly Ala Gly Pro Val Ala Leu Gly Gln Ser Leu Gly Gly Ser Val Leu  
100 105 110  
Ala Ala Leu Trp Cys Thr Arg Asp Leu Pro Val Arg Arg Leu Val Leu  
115 120 125  
Cys Ala Pro Ala Leu Gly Gln Gln Arg Ala Arg His Thr Ala Asp Thr  
130 135 140  
Leu Ala Glu Arg Arg Ala Leu Thr Gly Ser Gly Leu Arg Pro Val Gly  
145 150 155 160  
Leu Ala Asp Gly Asp Tyr Thr Asp Leu Pro Arg Tyr Arg Glu Phe Leu  
165 170 175  
Thr Gly Asp His Leu Met Leu Arg Glu Val Thr Ser Ala Thr Gln Ala  
180 185 190  
Thr Leu Val His Leu Glu Asp His Tyr Ala Arg Gly Ala Pro Arg Thr  
195 200 205  
Arg Leu Pro Val Asp Leu Ala Leu Pro Thr His Asp Pro Ile Ile Asp  
210 215 220  
Leu Ser Ala Ala Arg Ala Met Leu Arg Arg Leu Thr Ser Ala Val His  
225 230 235 240  
Glu Glu Val Phe Ala Thr Asp Arg His Tyr Val Glu Phe Thr Ser Ala  
245 250 255  
Arg Thr Ala Tyr Trp Asp Trp Leu Ala Thr Arg Leu Lys Glu Glu Ala  
260 265 270

<210> 13  
<211> 539  
<212> PRT  
<213> Streptomyces parvulus Tu4055

<400> 13  
Met Lys Val Phe His Ala Leu Ala Asp Ala Leu Thr Ala His Gly Val  
74

1	5	10	15
Asp Thr val Phe Gly Leu Met Gly Asn Ala Asn Leu Leu Tyr Leu Pro	20	25	30
Ala Phe Ala Asp Ala Gly Gly Arg Phe val Ala val Ala His Glu Ala	35	40	45
Gly Ala val Ala Met Ala Asp Gly Arg Ala Arg Met Cys Gly Gly Ile	50	55	60
Gly val Ala Ser val Thr His Gly Pro Ala Phe Thr Asn Ala Leu Thr	65	70	75
Pro Leu val Glu Ala Ala Arg Ser His Ser Gln val Leu Leu Ile Thr	85	90	95
Gly Asp Pro Pro Val Pro Thr His Phe His His Phe Asp Ile Ala	100	105	110
Thr val Ala Ala Ala Ala Gly Ala Gly Tyr Glu Arg val His Arg Pro	115	120	125
Ala ser Leu val Ala Asp Leu Asn Arg Ala val Gln Arg Ile val Ala	130	135	140
Glu Arg Arg Pro val val Leu Asn val Pro Ile Asp Leu Met Gln Ala	145	150	155
Glu Ala Gly Glu Gln Ala Pro val Thr Leu Pro val Ala Pro Gly Pro	165	170	175
Leu Ala Ala Pro Glu Ala Glu Ala Leu Asp Gly Ala Leu Gly Leu Ile	180	185	190
Gly Ser Ala Lys Arg Pro Leu val Leu Ala Gly His Gly Ala Ala val	195	200	205
Ala Gly Ala Arg Glu Ala Leu val Glu Leu Ala Asp Arg Thr Gly Ala	210	215	220
Ala Leu Ala Thr Thr val Leu Gly Lys Glu Met Phe Ala Gly His Pro	225	230	235
Arg Asp val Gly Ile Phe Gly Ser Leu Ala His Ser val Ala ser Thr	245	250	255
val Ile Ala Glu Ser Asp Cys val Ile Ala Phe Gly Ala Ser Leu Asn	260	265	270
Met Trp Thr val Leu Asn Gly Glu Leu Leu Arg Gly Lys Arg val val	275	280	285
His val Asp Thr Asp Pro Ala Arg Phe Gly Ser Tyr Ser Pro val Asp	290	295	300
Glu Pro val Ala Gly Asp Ala Arg Arg Thr Ala Glu Thr Met Asn val	305	310	315
Leu Leu Asp Gln Ala Gly val Thr Ala Ala Asn Gly Ala Trp Ala Glu	325	330	335
Arg val Ala Gly Gln Leu Ala Gly Phe Ser Pro Gln Asp Asp val Asp	340	345	350
Asp Arg ser Gly Ala Glu Thr val Asp Ile Arg Thr Ala Met Ile Arg	355	360	365

Leu Asp Arg Ile Leu Pro Ala Glu Arg Ser Val Val Ser Asp Ile Gly  
 370 375 380  
 Arg Phe Asp Val Gly Val Trp Pro Tyr Leu Arg Val Ala Asp Pro Leu  
 385 390 395 400  
 His Phe Thr Val Met Gly Gly Phe Gly Ser Ile Gly Leu Gly Val Ala  
 405 410 415  
 Gly Ala Ile Gly Ala Ala Thr Ala Gly Thr Gly Arg Pro Val Val Ala  
 420 425 430  
 Ala Val Gly Asp Gly Gly Phe Met Met His Leu Ser Glu Phe Thr Thr  
 435 440 445  
 Ala Val Arg Tyr Arg Leu Pro Leu Val Val Val Val Leu Asn Asp Gly  
 450 455 460  
 Ala Tyr Gly Ala Glu His Tyr Lys Leu Arg Asn His Gly Tyr Asp Pro  
 465 470 475 480  
 Ala Tyr Ser Ala Phe Ala Trp Pro Asp Leu Ala Gly Leu Ala Thr Ala  
 485 490 495  
 Met Gly Ala Arg Ala Leu Thr Val Arg Lys Ala Glu Glu Leu Asp Ala  
 500 505 510  
 Val Gly Asp Leu Leu Ser Thr Leu Glu Gly Pro Leu Leu Val Asp Val  
 515 520 525  
 Arg Leu Asp Pro Asp Val Asn Leu Val Arg Tyr  
 530 535

<210> 14  
 <211> 683  
 <212> PRT  
 <213> Streptomyces parvulus Tu4055

<400> 14  
 Met Arg Gly Ala Arg Glu Asn Ser Met Thr Arg Ala Gly Pro Leu Glu  
 1 5 10 15  
 Gly Ile Ala Val Leu Met Ala Gly Arg Ser Thr Pro Ala Ala Leu Leu  
 20 25 30  
 Gly Arg Leu Leu Ala Asp Leu Gly Ala Arg Val Val Thr Leu Cys Arg  
 35 40 45  
 Ser Pro Asp His Gly Gly Pro Phe Glu Arg Trp Leu His Ser Ala Ala  
 50 55 60  
 Gln Ser Ala Ser Gly Trp Asp Gln Ala Ser Arg Leu Leu Gln Thr Ala  
 65 70 75 80  
 Asp Val Leu Val Cys Asp Ala Glu Gly Asp Glu Arg Leu Ala Ala Leu  
 85 90 95  
 Gly Leu Gly Ala Pro Glu Leu Pro His Arg Ser Pro Glu Leu Val Ala  
 100 105 110  
 Val Arg Leu Ser Ala Phe Gly Leu Thr Gly Pro Leu Arg Asp Ala Pro  
 115 120 125  
 Ala Thr Glu Arg Thr Leu Gln Ala Leu Ala Gly Leu Thr Ser Ala Thr  
 130 135 140  
 Gly Thr Glu Gly Glu Pro Ser Val Leu Ser Val Val Gly Leu Ala Ser  
 145 150 155 160

Arg Thr Ala Ala Leu Ser Gly Leu Ile Ala Val Val Ala Gly Leu Ile  
 165 170 175  
 Gly Arg Glu Arg Gly Gly Gly Gly Asp Tyr Leu Asp Ile Ala Glu Phe  
 180 185 190  
 Asp Ser Leu Phe Thr Leu Thr Gly Thr Leu Leu Pro Ser Val Ala Leu  
 195 200 205  
 Ala Gly Arg Pro Pro Arg Arg Thr Gly Asn Arg His Gly Met Ala Ala  
 210 215 220  
 Pro Trp Asn Ser Tyr Thr Cys Gln Asp Ala Pro Val Val Ile Cys Thr  
 225 230 235 240  
 Met Gly Glu Pro Ile Trp His Arg Leu Thr Ala Val Leu Gly Arg Arg  
 245 250 255  
 Asp Leu Pro Asp Asp Pro Arg Phe Ala Asp Thr Ala Ala Arg Val Arg  
 260 265 270  
 Asn Ala Asp Glu Leu Asp Glu Ile Leu Gly Lys Trp Thr Ala Gly Gln  
 275 280 285  
 Arg Ala Val Asp Val Val Thr Ala Leu Arg Ala Ala Gly Ile Pro Cys  
 290 295 300  
 Ala Gln Val Ala Ala Pro Glu Glu Val Arg Asp Gly Ala Ala Ala Arg  
 305 310 315 320  
 Arg Arg Gly Leu Val Thr Asp Pro Ser Gly Thr Pro Gly Ser Pro Leu  
 325 330 335  
 Arg Ser Leu Ile Pro Ala Val Thr Asp Gly Pro Met Pro Arg Gln Gly  
 340 345 350  
 Gly Leu Trp Glu Pro Ile Ala Arg Gly Thr Pro Pro Leu Arg Gly Val  
 355 360 365  
 Arg Leu Leu Glu Val Gly Ser Tyr Thr Ala Gly Pro His Ala Gly Arg  
 370 375 380  
 Leu Leu Ala Gln Leu Gly Ala Asp Val Leu Lys Val Glu Pro Pro His  
 385 390 395 400  
 Gly Glu Gly Ser Arg Arg Leu Ala Gln Gln Val Ala Gly Val Gly Tyr  
 405 410 415  
 Leu Tyr Tyr Val Asn Asn Ala Gly Lys Arg Ser Cys Arg Leu Asp Leu  
 420 425 430  
 Ala Asp Ala Glu Asp Arg Ala Gly Phe Glu Arg Leu Leu Ala Gly Cys  
 435 440 445  
 Asp Ile Val Leu Thr Asn Leu Ala Ala Asp Thr Leu Thr Ala Gln Gly  
 450 455 460  
 Leu Ala Pro Asp Gln Ile Leu Ser Arg His Gly Val Val His Cys Thr  
 465 470 475 480  
 Val Thr Gly His Gly Leu Ala Ala Ala Asp Arg Ser Val Asp Thr Val  
 485 490 495  
 Ile Gln Ala Glu Ser Gly Ile Met Arg Leu Val Gly Gly Pro Gly Ala  
 500 505 510  
 Gly Leu Arg Thr Pro Val Ser Ser Ala Asp Val Leu Gly Ala Tyr Leu  
 77

515										520					525				
Ala	Ala	Ala	Ala	Ala	Val	Val	Ser	Thr	Tyr	Val	Arg	Leu	Arg	Thr	Glu				
530						535					540								
His	Gly	Cys	Ala	Ala	Asp	Val	Ala	Leu	Phe	Asp	Ser	Ala	Val	Trp	Leu				
545					550					555					560				
Thr	Gln	Asp	Arg	Trp	Phe	Thr	Ala	Pro	Pro	Ala	Arg	Ala	Pro	His	Leu				
				565					570					575					
Val	Arg	Ala	Ala	Asp	Gly	Thr	Val	Leu	Val	Asp	Ala	Glu	Gly	Pro	Pro				
			580					585					590						
Pro	Arg	Ala	Glu	Gly	Pro	Val	Ala	Ala	Val	Leu	Asp	Ala	Ala	Ala	Ala				
		595					600					605							
Val	Gly	Val	Pro	Ala	Ala	Pro	Leu	His	Asp	Leu	Thr	Arg	Ala	Val	Arg				
	610					615					620								
His	Pro	Gln	Val	Leu	Ala	Arg	Arg	Met	Ala	Val	Ala	Arg	Asp	Cys	Ala				
625					630					635					640				
Gly	Thr	Thr	Val	Leu	Ile	Thr	Gly	Asn	His	Leu	Arg	Ser	Leu	Leu	Arg				
				645					650					655					
Glu	Asp	Pro	Pro	Pro	Thr	Cys	Ala	Pro	Val	Asp	Gln	Asn	Asp	Pro	Val				
			660					665					670						
Trp	Leu	Gln	Pro	Ala	Pro	Thr	Glu	Gly	Gln	Gln									
		675					680												

<210> 15  
 <211> 426  
 <212> PRT  
 <213> Streptomyces parvulus Tu4055

<400> 15														
Met	Thr	Thr	Arg	Arg	Gln	Arg	His	Pro	Ala	Leu	Ser	Pro	Ser	Cys
1				5				10					15	
Pro	Ser	Val	Pro	Phe	Pro	Leu	Leu	Glu	Thr	Glu	Phe	Val	Leu	Met
			20					25					30	Pro
Ser	Phe	Pro	Val	Arg	Arg	Ser	Val	Pro	Asp	Thr	Pro	Pro	Ala	Glu
		35					40					45		His
Leu	Glu	Leu	Leu	Lys	Glu	Ser	Gly	Gly	Val	Cys	Pro	Phe	Thr	Met
	50					55					60			Glu
Asp	Gly	Arg	Pro	Ala	Trp	Leu	Ala	Ala	Ser	His	Asp	Ala	Val	Arg
65					70					75				80
Leu	Leu	Ala	Asp	Arg	Arg	Ile	Ser	Asn	Asn	Pro	Ala	Lys	Thr	Pro
				85					90					95
Phe	Ser	Gln	Arg	Glu	Ala	Leu	Gln	Lys	Glu	Arg	Gly	Gln	Phe	Ser
			100					105					110	Arg
His	Leu	Phe	Asn	Met	Asp	Ser	Pro	Glu	His	Asp	Val	Ala	Arg	Arg
		115					120					125		Met
Ile	Ala	Glu	Asp	Phe	Thr	Pro	Arg	His	Ala	Glu	Ala	Val	Arg	Pro
	130					135					140			Tyr
Phe	Glu	Glu	Val	Phe	Gly	Glu	Ile	Val	Asp	Glu	Val	Val	His	Lys
145					150					155				Gly
														160

Pro Pro Ala Glu Met Ile Glu Ser Phe Ala Phe Pro Val Ala Thr Arg  
 165 170 175  
 Thr Ile Cys Lys Val Leu Asp Ile Pro Glu Asp Asp Cys Glu Tyr Phe  
 180 185 190  
 Gln Lys Arg Thr Glu Gln Ile Ile Glu Met Asp Arg Gly Glu Glu Asn  
 195 200 205  
 Leu Glu Ala Val Val Glu Leu Arg Arg Tyr Val Asp Ser Val Met Gln  
 210 215 220  
 Gln Arg Thr Arg Lys Pro Gly Asp Asp Leu Leu Ser Arg Met Ile Val  
 225 230 235 240  
 Lys Ala Lys Ala Ser Lys Glu Ile Glu Leu Ser Asp Ala Asp Leu Val  
 245 250 255  
 Asp Asn Ala Met Phe Leu Leu Val Ala Gly His Glu Pro Ser Ala Asn  
 260 265 270  
 Met Leu Gly Leu Gly Val Leu Ala Leu Ala Glu Phe Pro Asp Val Ala  
 275 280 285  
 Glu Glu Leu Arg Ala Glu Pro His Leu Trp Pro Gly Ala Ile Asp Glu  
 290 295 300  
 Met Leu Arg Tyr Tyr Thr Ile Ala Arg Ala Thr Lys Arg Val Ala Ala  
 305 310 315 320  
 Ala Asp Ile Glu Tyr Glu Gly His Thr Ile Lys Glu Gly Asp Ala Val  
 325 330 335  
 Ile Val Leu Leu Asp Thr Ser Asn Arg Asp Pro Lys Val His Ala Glu  
 340 345 350  
 Pro Asn Arg Leu Asp Ile His Arg Ser Ala Gly Asn His Leu Ala Phe  
 355 360 365  
 Ser His Gly Pro His Gln Cys Leu Gly Lys His Leu Val Arg Val Gln  
 370 375 380  
 Leu Glu Ile Ala Leu Arg Ala Val Ala Glu Arg Leu Pro Gly Leu Arg  
 385 390 395 400  
 Leu Asp Ile Ala Lys Glu Asp Ile Pro Phe Arg Gly Asp Ala Leu Ser  
 405 410 415  
 Tyr Gly Pro Arg Gln Leu Arg Val Thr Trp  
 420 425

<210> 16  
 <211> 454  
 <212> PRT  
 <213> Streptomyces parvulus Tu4055

<400> 16  
 Met Glu Lys Thr Asp Val Asp Arg Leu Arg Thr Leu Asp Arg Glu His  
 1 5 10 15  
 Met Trp Tyr Pro Trp Thr Pro Met Thr Glu Trp Met Ala Arg Asp Gln  
 20 25 30  
 Leu Val Val Glu Arg Ala Glu Gly Cys Trp Leu Ile Asp Ala Asp Gly  
 35 40 45  
 Lys Arg Tyr Leu Asp Gly Arg Ser Ser Met Gly Met Asn Leu His Gly  
 50 55 60

His Gly Arg Ser Glu Ile Val Glu Ala Leu Val Ala Gln Ala Arg Lys  
 65 70 75 80  
 Ala Gly Glu Thr Thr Leu Tyr Arg Val Ser His Pro Ala Ala Val Glu  
 85 90 95  
 Leu Ala Ala Arg Leu Ala Ser Met Ala Pro Ala Gly Leu Gln Arg Val  
 100 105 110  
 Phe Phe Ala Glu Ser Gly Ser Thr Ala Val Glu Thr Ala Leu Lys Ala  
 115 120 125  
 Ala Tyr Ala Tyr Trp Val Ala Lys Gly Glu Pro Gln Arg Ser Thr Phe  
 130 135 140  
 Val Ser Met Glu Gly Gly Tyr His Gly Glu Thr Leu Gly Thr Val Ser  
 145 150 155 160  
 Leu Arg Gly Thr Asn Gly Glu Gln Val Asp Met Ile Arg Lys Thr Tyr  
 165 170 175  
 Glu Pro Leu Leu Phe Pro Ser Leu Ser Phe His Gln Pro His Cys Tyr  
 180 185 190  
 Arg Cys Pro Val Gly Gln Ser Ser Asp Ser Asp Cys Gly Leu Glu Cys  
 195 200 205  
 Thr Asp Ser Leu Glu Asn Leu Leu Thr Arg Glu Lys Gly Arg Ile Ala  
 210 215 220  
 Ala Val Ile Val Glu Pro Arg Val Gln Ala Leu Ala Gly Val Ile Thr  
 225 230 235 240  
 Ala Pro Glu Gly His Leu Ala Lys Val Ala Glu Ile Thr Arg Arg His  
 245 250 255  
 Gly Val Leu Leu Ile Val Asp Glu Val Leu Thr Gly Trp Ala Arg Thr  
 260 265 270  
 Gly Pro Thr Phe Ser Cys Glu Ala Glu Gly Val Thr Pro Asp Leu Met  
 275 280 285  
 Thr Val Gly Lys Ala Leu Thr Gly Gly Tyr Leu Pro Leu Ser Ala Thr  
 290 295 300  
 Leu Ala Thr Glu Glu Ile Phe Gly Ala Phe Arg Glu Ser Val Phe Leu  
 305 310 315 320  
 Ser Gly Ser Thr Tyr Ser Gly Tyr Ala Leu Gly Ala Ala Val Ala Leu  
 325 330 335  
 Ala Ser Leu Asp Leu Phe Glu Lys Glu Asp Val Pro Ala Arg Ala Lys  
 340 345 350  
 Ala Leu Ala Asp Val Leu Thr Thr Ala Leu Glu Pro Phe Arg Ala Leu  
 355 360 365  
 Thr His Val Gly Asp Val Arg Gln Leu Gly Leu Ile Ala Gly Val Glu  
 370 375 380  
 Leu Val Ala Asp Arg Glu Thr Arg Ala Pro Tyr Pro Pro Gln Glu Arg  
 385 390 395 400  
 Val Val Asp Arg Ile Cys Thr Leu Ala Arg Asp Asn Gly Val Leu Val  
 405 410 415  
 Asn Ala Val Pro Gly Asp Val Ile Thr Met Leu Pro Ser Pro Ser Met  
 80



420 425 430

Ser Pro Asp Asp Leu Arg Phe Leu Thr Gly Thr Leu Tyr Thr Ala Val  
435 440 445

Arg Glu Val Thr Glu Glu  
450

<210> 17  
<211> 326  
<212> PRT  
<213> Streptomyces parvulus Tu4055

<400> 17

Met Arg Ala Ala Val Ile Arg Ala Trp Gly Gly Pro Glu Arg Leu Thr  
1 5 10 15

Leu Asp Arg Val Glu Arg Pro Ser Pro Pro Gly Trp Ile Ala Val  
20 25 30

Arg Val Glu Ala Cys Ala Leu Asn His Leu Asp Ile His Val Arg Asn  
35 40 45

Gly Leu Pro Gly Val Arg Leu Glu Leu Pro His Val Ser Gly Gly Asp  
50 55 60

Val Val Gly Val Val Glu Gln Ala Thr Asp Glu Ala Gly Glu Arg Leu  
65 70 75 80

Leu Gly Ser Arg Val Leu Leu Asp Pro Met Ile Gly Arg Gly Ile Leu  
85 90 95

Gly Glu His Tyr Trp Gly Gly Leu Ala Glu Tyr Val Val Ala Pro Ala  
100 105 110

His Asn Ala Leu Pro Val Pro Asp Gln Asp Ala Asp Pro Ala Arg Tyr  
115 120 125

Ala Ala Leu Pro Ile Ser Tyr Gly Thr Ala Gln Arg Met Leu Phe Ser  
130 135 140

Arg Ala Arg Leu Arg Pro Gly Glu Ser Val Leu Leu Phe Gly Ala Thr  
145 150 155 160

Gly Gly Val Gly Val Ala Cys Ala Gln Leu Ala Leu Arg Ala Gly Ala  
165 170 175

Arg Ile Ile Ala Cys Ser Gly Ser Pro Ala Lys Leu Ala Arg Leu Arg  
180 185 190

Arg Leu Gly Val Ile Asp Thr Ile Asp Thr Gly Thr Glu Asp Val Arg  
195 200 205

Arg Arg Val Arg Glu Leu Thr Asp Gly Gly Ala Asp Leu Val Val Asp  
210 215 220

Tyr Gln Gly Lys Asp Thr Trp Pro Val Ser Leu Arg Ser Ala Arg Ala  
225 230 235 240

Gly Gly Arg Ile Val Thr Cys Gly Ala Thr Thr Gly Tyr Glu Ala Thr  
245 250 255

Thr Asp Leu Arg Tyr Val Trp Ser Arg Gln Leu Asp Ile Leu Gly Ser  
260 265 270

Asn Ala Trp His Arg Asp Asp Leu His Thr Leu Val Asp Leu Val Ala  
275 280 285

Thr Asp Ala Leu Glu Pro Val Val His Ala Asp Phe Pro Leu Ser Arg  
290 295 300

Ala Pro Glu Ala Val Ala Glu Leu Glu Glu Arg Arg Ala Phe Gly Lys  
305 310 315 320

Val Val Ile Arg Thr Ala  
325

<210> 18  
<211> 556  
<212> PRT  
<213> Streptomyces parvulus Tu4055

<400> 18  
Met Thr Gly Asn Thr Thr Ser Ala Ala Phe Leu Arg Arg Thr Gln Asn  
1 5 10 15

Ala Leu Ala Met Gln Arg Lys Ile Cys Ala Gln Pro Glu Glu Thr Ala  
20 25 30

Glu Arg Val Phe Ser Asp Ile Leu Ser Val Ser Arg Asp Thr Gly Phe  
35 40 45

Gly Arg Glu His Gly Leu Ala Gly Val Arg Thr Arg Gln Glu Trp Arg  
50 55 60

Arg Ala Val Pro Ile Arg Thr Tyr Asp Glu Leu Ala Pro Tyr Val Glu  
65 70 75 80

Arg Gln Phe Ser Gly Glu Arg Arg Val Leu Thr Thr Asp Asp Pro Arg  
85 90 95

Ala Phe Leu Arg Thr Ser Gly Ser Thr Gly Arg Ala Lys Leu Val Pro  
100 105 110

Thr Thr Asp His Trp Arg Arg Val Tyr Arg Gly Pro Ala Leu Tyr Ala  
115 120 125

Gln Trp Gly Leu Tyr Phe Glu Gln Ile Gly Thr His Arg Leu Thr Gly  
130 135 140

Asp Glu Val Leu Asp Leu Ser Trp Glu Pro Gly Pro Ile Arg His Arg  
145 150 155 160

Leu Arg Gly Phe Pro Val Tyr Ser Ile Thr Glu Arg Pro Val Ser Asp  
165 170 175

Asp Pro Asp Asp Trp Asn Pro Pro Trp Arg His Ala Arg Trp Phe Thr  
180 185 190

Arg Asp Ala Gly Ala Ala Thr Met Ala Asp Leu Leu Tyr Gly Lys Leu  
195 200 205

Leu Arg Leu Ala Ala His Asp Leu Arg Leu Ile Val Ser Val Asn Pro  
210 215 220

Ser Lys Ile Val Leu Leu Ala Glu Thr Leu Lys Glu Asn Ala Glu Arg  
225 230 235 240

Leu Ile Gln Asp Leu His Asp Gly His Gly Thr Asp Arg Ala Ala Arg  
245 250 255

Pro Asp Phe Leu Arg Arg Leu Thr Ala Ala Phe Asp Arg Thr Gly Gly  
260 265 270

Arg Pro Leu Leu Thr Asp Leu Trp Pro Gly Leu Arg Leu Leu Val Cys  
275 280 285

Trp Asn Ser Ala Ser Ala Ala Leu Tyr Gly Pro Trp Leu Ser Arg Leu  
 290 295 300  
 Ala Thr Gly Val Ala Ala Leu Pro Phe Ser Thr Thr Gly Thr Glu Gly  
 305 310 315 320  
 Ile Val Thr Leu Pro Val Asp Asp His Leu Ser Ala Gly Pro Leu Ala  
 325 330 335  
 Val Asp Gln Gly His Phe Glu Phe Val Pro Trp Gln Asp Leu Asp Asp  
 340 345 350  
 Gly Ser Pro Leu Pro Glu Asp Thr Pro Thr Leu Gly Tyr Asp Glu Leu  
 355 360 365  
 Glu Leu Gly Ala Asp Tyr Arg Leu Val Met Ser Gln Ala Asn Gly Leu  
 370 375 380  
 Tyr Arg Tyr Asp Val Gly Asp Val Tyr Arg Val Val Gly Ala Val Gly  
 385 390 395 400  
 Ala Thr Pro Arg Leu Glu Phe Leu Gly Arg Ala Gly Phe Gln Ser Ser  
 405 410 415  
 Phe Thr Gly Glu Lys Leu Thr Glu Ser Asp Val His Thr Ala Val Met  
 420 425 430  
 Arg Val Leu Gly Ser Glu Arg Thr Asp His Pro His Phe Ser Gly Ile  
 435 440 445  
 Pro Val Trp Asp Thr Pro Pro His Tyr Leu Val Ala Ile Glu Trp Ala  
 450 455 460  
 Asp Ala His Gly Thr Leu Asn Val Gln Asp Thr Ala Arg Arg Ile Asp  
 465 470 475 480  
 Ala Thr Leu Gln Glu Val Asn Val Glu Tyr Ala Asp Lys Arg Arg Ser  
 485 490 495  
 Gly Arg Leu Arg Pro Leu Gln Ile Leu Pro Leu Val Pro Gly Ala Phe  
 500 505 510  
 Gly Gln Ile Ala Glu Arg Arg Phe Arg Gln Gly Thr Ala Gly Ala Gln  
 515 520 525  
 Ile Lys His His Trp Leu Gln Lys Asp Ser Ala Phe Leu Asp Thr Leu  
 530 535 540  
 Arg Asp Leu Asp Leu Val Arg Ala Arg Pro Gly Thr  
 545 550 555

<210> 19  
 <211> 305  
 <212> PRT  
 <213> Streptomyces parvulus Tu4055

<400> 19  
 Met Arg Ile Gly Phe Ala Ala Pro Met Ser Gly Pro Trp Ala Thr Pro  
 1 5 10 15  
 Asp Thr Ala Val His Val Ala Arg Thr Ala Glu Gln Leu Gly Tyr Ala  
 20 25 30  
 Ser Leu Trp Thr Tyr Gln Arg Val Leu Gly Ala Pro Asp Asp Ser Trp  
 35 40 45  
 Gly Glu Ala Asn Arg Ser Val His Asp Pro Leu Thr Thr Leu Ala Phe  
 83

50                      55                      60  
 Leu Ala Ala His Thr Thr Gly Ile Arg Leu Gly Val Ala Val Leu Ile  
 65                      70                      75                      80  
 Met Pro Leu His Thr Pro Ala Val Leu Ala Lys Gln Leu Thr Thr Leu  
 85                      90                      95  
 Asp Leu Leu Ser Gly Gly Arg Leu Asp Val Gly Leu Gly Asn Gly Trp  
 100                      105                      110  
 Ala Ala Glu Glu Tyr Ala Ala Ala Gly Val Thr Pro Thr Gly Leu Ser  
 115                      120                      125  
 Arg Arg Ala Glu Asp Phe Leu Ala Cys Leu Arg Ala Leu Trp Gly Glu  
 130                      135                      140  
 Gln Thr Val Val Glu His Asp Gly Pro Phe Tyr Arg Val Pro Pro Ala  
 145                      150                      155                      160  
 Arg Phe Asp Pro Lys Pro Ala Gln Ser Pro His Pro Pro Leu Leu Leu  
 165                      170                      175  
 Gly Gly Ala Ala Pro Gly Ala Leu Arg Arg Ala Gly Arg Leu Cys Asp  
 180                      185                      190  
 Gly Trp Ile Ala Ser Ser Lys Ala Gly Pro Ala Ala Ile Arg Asp Ala  
 195                      200                      205  
 Ile Thr Val Val Arg Asp Ser Ala Glu Arg Thr Gly Arg Asp Pro Ala  
 210                      215                      220  
 Thr Leu Arg Phe Val Cys Arg Ala Pro Val Arg Leu Arg Thr Arg Ser  
 225                      230                      235                      240  
 Ala Pro Asn Glu Pro Pro Leu Thr Gly Thr Ala Glu Thr Ile Arg Ala  
 245                      250                      255  
 Asp Leu Ala Ala Leu Ala Asp Thr Gly Leu Thr Glu Ile Phe Leu Asp  
 260                      265                      270  
 Pro Asn Phe Asp Pro Glu Ile Gly Ser Pro Asp Ala Pro Thr Gly Asp  
 275                      280                      285  
 Val Arg His Arg Val Asp Leu Leu Leu His Glu Leu Ala Pro Ala Asn  
 290                      295                      300  
 Trp  
 305

<210> 20  
 <211> 248  
 <212> PRT  
 <213> Streptomyces parvulus Tu4055

<400> 20  
 Met Leu Ile Ala Arg Ala Ala Val Gly Glu Asp Arg Thr Tyr Ala Arg  
 1                      5                      10                      15  
 Val Asp Thr Asp Thr Gly Leu Ile His Leu Leu Ala Gly Thr Pro Tyr  
 20                      25                      30  
 Asp Glu Ile Arg Pro Thr Gly Glu Thr Arg Pro Leu Ala Glu Ala Arg  
 35                      40                      45  
 Leu Leu Ala Pro Val Glu Pro Ser Lys Val Leu Val Ala Gly Arg Asn  
 50                      55                      60

Tyr Gly Asp Val Val Thr Pro Asp Leu Val Val Phe Met Lys Pro Ser  
 65 70 75 80  
 Thr Ser Val Val Gly Pro Arg Ser Thr Val Leu Leu Pro Ala Glu Ala  
 85 90 95  
 Lys Gln Val Arg Tyr Glu Gly Glu Leu Ala Val Val Ile Gly Arg Arg  
 100 105 110  
 Cys Lys Asp Val Pro Glu Asp Thr Ala Asp Gln Ala Val Phe Gly Tyr  
 115 120 125  
 Thr Cys Ala Asn Asp Val Thr Ala Trp Asp Val Gly Glu Pro Lys Gly  
 130 135 140  
 His Trp Thr Lys Ala Lys Ser Phe Asp Thr Phe Cys Pro Leu Gly Pro  
 145 150 155 160  
 Trp Ile Arg Thr Asp Leu Asp Pro Ala Asp Leu Val Leu Arg Thr Thr  
 165 170 175  
 Val Asn Gly Thr Leu Arg Gln Asp Gly Ser Thr Lys Glu Met Asn Arg  
 180 185 190  
 Asn Val Arg Ala Leu Val Ser Arg Cys Ser Ser Leu Met Thr Leu Leu  
 195 200 205  
 Pro Gly Asp Val Ile Leu Thr Gly Thr Pro Ala Gly Ala Gly Val Leu  
 210 215 220  
 Arg Pro Gly Asp Glu Val Val Val Glu Ile Asp Gly Ile Gly Ser Leu  
 225 230 235 240  
 Ala Asn Pro Ile Gly Val Ala Lys  
 245

<210> 21  
 <211> 675  
 <212> PRT  
 <213> Streptomyces parvulus Tu4055

<400> 21  
 Met Ser Val Ile Arg Pro Thr Ala Glu Thr Glu Arg Ala Val Val Val  
 1 5 10 15  
 Val Pro Ala Gly Thr Thr Cys Ala Asp Ala Val Thr Ala Ala Lys Leu  
 20 25 30  
 Pro Arg Asn Gly Pro Asn Ala Ile Val Val Val Arg Asp Pro Ser Gly  
 35 40 45  
 Ala Leu Arg Asp Leu Asp Trp Thr Pro Asp Ser Asp Val Glu Val Glu  
 50 55 60  
 Ala Val Ala Leu Ser Ser Glu Asp Gly Leu Thr Val Leu Arg His Ser  
 65 70 75 80  
 Thr Ala His Val Leu Ala Gln Ala Val Gln Gln Leu Trp Pro Glu Ala  
 85 90 95  
 Arg Leu Gly Ile Gly Pro Pro Ile Glu Asn Gly Phe Tyr Tyr Asp Phe  
 100 105 110  
 Asp Val Glu Arg Pro Phe Gln Pro Glu Asp Leu Glu Arg Val Glu Gln  
 115 120 125  
 Arg Met Lys Glu Ile Ile Lys Ser Gly Gln Arg Phe Cys Arg Arg Glu  
 130 135 140

Phe Pro Asp Arg Glu Ala Ala Arg Ala Glu Leu Ala Lys Glu Pro Tyr  
145 150 155 160  
Lys Leu Glu Leu Val Asp Leu Lys Gly Asp Val Asp Ala Ala Glu Ala  
165 170 175  
Met Glu Val Gly Gly Ser Asp Leu Thr Ile Tyr Asp Asn Leu Asp Ala  
180 185 190  
Arg Thr Gly Asp Val Cys Trp Ser Asp Leu Cys Arg Gly Pro His Leu  
195 200 205  
Pro Ser Thr Arg Leu Ile Pro Ala Phe Lys Leu Leu Arg Asn Ala Ala  
210 215 220  
Ala Tyr Trp Arg Gly Ser Glu Lys Asn Pro Gln Leu Gln Arg Ile Tyr  
225 230 235 240  
Gly Thr Ala Trp Pro Thr Arg Asp Glu Leu Lys Ser His Leu Ala Ala  
245 250 255  
Leu Glu Glu Ala Ala Lys Arg Asp His Arg Arg Ile Gly Glu Glu Leu  
260 265 270  
Asp Leu Phe Ala Phe Asn Lys Glu Ile Gly Arg Gly Leu Pro Leu Trp  
275 280 285  
Leu Pro Asn Gly Ala Ile Ile Arg Asp Glu Leu Glu Asp Trp Ala Arg  
290 295 300  
Lys Thr Glu Arg Lys Leu Gly Tyr Lys Arg Val Val Thr Pro His Ile  
305 310 315 320  
Thr Gln Glu Asp Leu Tyr Tyr Leu Ser Gly His Leu Pro Tyr Tyr Ala  
325 330 335  
Glu Asp Leu Tyr Ala Pro Ile Asp Ile Asp Gly Glu Lys Tyr Tyr Leu  
340 345 350  
Lys Pro Met Asn Cys Pro His His His Met Val Tyr Lys Ala Arg Pro  
355 360 365  
His Ser Tyr Arg Asp Leu Pro Tyr Lys Val Ala Glu Tyr Gly Thr Val  
370 375 380  
Tyr Arg Phe Glu Arg Ser Gly Gln Leu His Gly Met Met Arg Thr Arg  
385 390 395 400  
Gly Phe Ser Gln Asn Asp Ala His Ile Tyr Cys Thr Ala Asp Gln Ala  
405 410 415  
Lys Asp Gln Phe Leu Glu Val Met Arg Met His Ala Asp Tyr Tyr Arg  
420 425 430  
Thr Leu Gly Ile Ser Asp Phe Tyr Met Val Leu Ala Leu Arg Asp Ser  
435 440 445  
Ala Asn Lys Asp Lys Tyr His Asp Asp Glu Gln Met Trp Glu Asp Ala  
450 455 460  
Glu Arg Ile Thr Arg Glu Ala Met Glu Glu Ser Asp Ile Pro Phe Gln  
465 470 475 480  
Ile Asp Leu Gly Gly Ala Ala His Tyr Gly Pro Lys Val Asp Phe Met  
485 490 495  
Ile Arg Ala Val Thr Gly Lys Glu Phe Ala Ala Ser Thr Asn Gln Val  
86

500 505 510  
 Asp Leu Tyr Thr Pro Gln Arg Phe Gly Leu Thr Tyr His Asp Ser Asp  
 515 520 525  
 Gly Thr Glu Lys Pro Val Val Val Ile His Arg Ala Pro Leu Gly Ser  
 530 535 540  
 His Glu Arg Phe Thr Ala Tyr Leu Thr Glu His Phe Ala Gly Ala Phe  
 545 550 555 560  
 Pro Val Trp Leu Ala Pro Glu Gln Val Arg Ile Ile Pro Ile Val Glu  
 565 570 575  
 Glu Leu Thr Asp Tyr Ala Glu Glu Val Arg Asp Met Leu Leu Asp Ala  
 580 585 590  
 Asp Val Arg Ala Asp Val Asp Ala Gly Asp Gly Arg Leu Asn Ala Lys  
 595 600 605  
 Val Arg Ala Ala Val Thr Arg Lys Ile Pro Leu Val Val Val Val Gly  
 610 615 620  
 Arg Arg Glu Ala Glu Gln Arg Thr Val Thr Val Arg Asp Arg Ser Gly  
 625 630 635 640  
 Glu Glu Thr Pro Met Ser Leu Glu Lys Phe Val Ala His Val Thr Gly  
 645 650 655  
 Leu Ile Arg Thr Lys Ser Leu Asp Gly Ala Gly His Ile Arg Pro Leu  
 660 665 670  
 Ser Lys Ala  
 675

<210> 22  
 <211> 103  
 <212> PRT  
 <213> Streptomyces parvulus Tu4055

<400> 22  
 Met Pro Arg Gly Ile Ala Val Asp Val Leu Arg Ala Gly Asp Arg Trp  
 1 5 10 15  
 Pro His Ser Ala Ala Pro Arg His Arg Gly Leu Leu Asn Ala Trp Trp  
 20 25 30  
 Gly Ala Trp Val Trp Ala Thr Val Phe Asp Arg Tyr Ala Ser Arg Thr  
 35 40 45  
 Tyr Asp Asp Ala Gln Asp Val Asp Ala Ile His Asp Ala Ala Gly Leu  
 50 55 60  
 Val Met Ala Gly Ala Gly Phe Asp Ile Leu Ala Ala Val Leu Ala Ile  
 65 70 75 80  
 Leu Phe Val Arg Arg Leu Thr Ala Ala Gln His Ala Lys Ala Leu Ala  
 85 90 95  
 Gly Pro Thr Pro Pro Thr His  
 100

<210> 23  
 <211> 868  
 <212> PRT  
 <213> Streptomyces parvulus Tu4055

<400> 23

Met Glu Ala Phe Leu<sub>5</sub> Leu Leu Ala Ala Glu<sub>10</sub> Ser Val Leu Leu Arg Arg<sub>15</sub>  
Asp Gln Ser Val<sub>20</sub> Tyr Val Thr Pro Gly<sub>25</sub> Ser Glu Pro Asp Gly<sub>30</sub> Pro Pro  
Arg Ala Ala<sub>35</sub> Leu Arg Arg Leu Glu<sub>40</sub> Ala Glu Leu Leu Gly<sub>45</sub> Arg Gly His  
Ala Val Ser Ala Pro Leu His<sub>55</sub> Ala Val Leu Ala Ser<sub>60</sub> Leu Asp Ser Glu  
Glu<sub>65</sub> Leu Ala Ala Ala His<sub>70</sub> Val Arg Leu Val Gly<sub>75</sub> Leu Val Asp Asp Leu<sub>80</sub>  
Leu Gly Ser Asp Arg<sub>85</sub> Thr His Thr Pro Leu<sub>90</sub> Phe Arg Arg Phe Pro Arg<sub>95</sub>  
Thr Val Pro Arg<sub>100</sub> Asp Thr Glu Ala Leu<sub>105</sub> Tyr Val Asp Arg Val<sub>110</sub> Phe Ala  
Phe Leu Leu<sub>115</sub> Gln Gln Pro Glu Gln<sub>120</sub> Pro Cys Val Leu Cys<sub>125</sub> Gly Glu Ala  
Arg Thr Val Leu Pro Val Ser<sub>135</sub> Pro Cys Ala His Leu<sub>140</sub> Val Cys Arg Leu  
Cys<sub>145</sub> Trp Asp Gly Ser Asp<sub>150</sub> Tyr Ala Gly Cys Pro<sub>155</sub> Leu Cys His Arg Arg<sub>160</sub>  
Ile Asp Gly Asp Asp<sub>165</sub> Pro Phe Leu Arg Pro<sub>170</sub> Val Arg Ala Val Gly<sub>175</sub> Ala  
Ala Arg Ala Thr<sub>180</sub> Val Pro Gly Pro Leu<sub>185</sub> Arg Leu Leu Arg Leu<sub>190</sub> Gly Thr  
Asp Met Thr<sub>195</sub> Ala Asp Ala Thr Thr<sub>200</sub> Ala Val Asp Ala Leu<sub>205</sub> Leu Ala Arg  
Arg Thr Pro Leu Ser Pro Gln<sub>215</sub> Asp Arg Asp Asp Leu<sub>220</sub> Leu Thr Leu Leu  
Pro<sub>225</sub> Leu Thr Pro Ala Gly<sub>230</sub> Arg Gly Asp Leu Pro<sub>235</sub> Gln Asp Ile Pro Val<sub>240</sub>  
Arg Glu Thr Lys Ala<sub>245</sub> Leu Val Leu Gly Ala<sub>250</sub> Leu Val Arg Arg Ala<sub>255</sub> Pro  
Ser Arg Pro Ala<sub>260</sub> Leu Arg Arg Leu Leu<sub>265</sub> Ala Glu Arg Leu Thr<sub>270</sub> Thr Ala  
Thr Asp Val<sub>275</sub> Leu Arg Leu Leu Ala<sub>280</sub> Val Leu Ser Gly Gly<sub>285</sub> Asp Ala Gly  
Leu Val Thr Pro Ala Arg Phe<sub>295</sub> Thr Asn Val Pro Arg<sub>300</sub> Ser Leu Arg Arg  
Asp<sub>305</sub> Leu Leu Ala Val Leu<sub>310</sub> Asp Gly Leu Pro Ala<sub>315</sub> Pro Tyr Leu Val Glu<sub>320</sub>  
Asp Met Leu Arg His<sub>325</sub> Pro Thr Ala Trp Lys<sub>330</sub> Arg Ala Ala Glu Val<sub>335</sub> Leu  
His Pro Phe Glu Gly His Thr Arg His<sub>345</sub> Pro Arg Ala Ala Leu<sub>350</sub> Ala Thr  
Ala Val Leu<sub>355</sub> Arg Ala Thr Pro Leu<sub>360</sub> Asp Pro Asp Thr Ala<sub>365</sub> Phe Gly Ala



Ala Leu Leu Thr Thr Ala Ala Ala His Pro Asp Ala Val Arg Pro Asp  
 370 375 380  
 Gly Thr Arg Val Arg Pro Ala Thr Trp Ala Gly Arg Leu Glu Gln Ala  
 385 390 395 400  
 Met Ala Glu Gly Asp Ala Ala Arg Ala Ala Ala Leu Ala Gly Glu Arg  
 405 410 415  
 Pro Gly Glu Leu Val Arg Arg Leu Asp Val Leu Leu Arg Leu His Thr  
 420 425 430  
 Asp Glu Ala Leu Val Pro Glu Leu Glu Lys Ala Leu Arg His Gly Leu  
 435 440 445  
 Pro Lys Val Gly Pro Gly Pro Leu Leu Ser Ala Leu Gly Ala Leu Arg  
 450 455 460  
 Thr Arg Thr Glu Asp Arg Thr Gly Thr Arg Arg Val Phe Phe Pro Arg  
 465 470 475 480  
 Gly Asp Val Thr Arg Ala Leu Ser Val Pro Glu Arg Arg Pro Ala Leu  
 485 490 495  
 Pro Ala Gly Pro Val Ser Glu Val Val Ala Leu Leu Glu Gly Glu Leu  
 500 505 510  
 Leu Arg Arg Phe Ala Ala Gly Arg Pro Tyr Glu Leu Ser Val Leu Asp  
 515 520 525  
 Ala Gly Leu Thr Asp Leu Thr Val Pro Phe Thr Glu Arg Thr Ala Ala  
 530 535 540  
 Lys Ala Leu Val Thr Val Gly Arg Gly Ser Val Gln Ala Leu Pro Glu  
 545 550 555 560  
 Gly Ser Val Leu Arg Leu Phe Leu His Trp Thr Glu Pro Arg Gly Asn  
 565 570 575  
 Arg Thr Asp Leu Asp Leu Ser Val Ala Phe Phe Asp Ala Glu Trp Thr  
 580 585 590  
 Phe Thr Gly Leu Cys Asp Tyr Thr Asn Leu Val His Gly Pro Asp Ala  
 595 600 605  
 Ala Ile His Ser Gly Asp Leu Thr Ser Ala Pro Ala Pro Arg Gly Ala  
 610 615 620  
 Thr Glu Tyr Val Asp Leu Asp Leu Glu Arg Leu Ala Arg Arg Gly Asp  
 625 630 635 640  
 Thr Tyr Ala Val Pro Leu Val Phe Ser Tyr Asn Asn Val Pro Phe Glu  
 645 650 655  
 Glu Leu Pro Asp Ala Phe Ala Gly Phe Met Ala Leu Pro Ala Glu Gly  
 660 665 670  
 Pro Arg Asp Ala Thr Tyr Asp Pro Arg Thr Val Arg Gln Arg Phe Asp  
 675 680 685  
 Leu Ala Gly Asp Ser Lys Val Cys Leu Pro Met Ile Val Asp Leu Ala  
 690 695 700  
 Arg Arg Arg Ala Leu Trp Thr Asp Thr His Leu Pro Ser Ala Gly Gly  
 705 710 715 720  
 Phe Gln Ser Ile Gly Ser His Gly Gly Gly Glu Leu Ala Ala Val Ala  
 89



Pro Ala Thr Thr Phe Gly Thr Val Asn Ala Asp Val Leu Glu His Phe  
180 185 190

Ala Pro Gly Phe Arg Arg Thr Asp Phe Val Glu Val Ile Glu Asn Ser  
195 200 205

Ala Trp Pro Glu  
210

<210> 25  
<211> 329  
<212> PRT  
<213> Streptomyces parvulus Tu4055

<400> 25  
Met Thr Ala Arg Ala His Ser Val Gly Ile Leu Val Phe Asp Gly Met  
1 5 10 15

Lys Met Leu Asp Leu Ser Gly Pro Ala Glu Val Phe Ala Glu Ala Asn  
20 25 30

Arg Phe Gly Ala Arg Tyr Arg Leu Gly Val Val Ser Pro Asp Gly Ala  
35 40 45

Pro Val Arg Ser Ser Ile Gly Leu Leu Val Pro Ala Glu Ala Asp Ala  
50 55 60

Arg Ser Ala Gly Pro Pro Asp Thr Leu Val Val Val Gly Gly Asp Ala  
65 70 75 80

Leu Pro Gly Ser Pro Val Asp Pro Arg Leu Ile Asp Ala Ala Lys Ala  
85 90 95

Leu Ala Ala Arg Ala Gly Arg Val Ala Ser Val Cys Thr Gly Ala Phe  
100 105 110

Val Leu Gly Ala Ala Gly Leu Leu Glu Gly Arg Arg Ala Thr Thr His  
115 120 125

Trp Gln His Thr Thr Ala Leu Ala Arg Arg Cys Pro Ser Thr Arg Val  
130 135 140

Glu Pro Asp Ala Ile Phe Val Lys Asp Gly Ala Thr Tyr Thr Ser Ala  
145 150 155 160

Gly Val Thr Ala Gly Ile Asp Leu Ala Leu Ala Leu Leu Glu Glu Asp  
165 170 175

His Gly Pro Asp Leu Ala Arg Arg Val Ala Arg Ser Leu Val Val Tyr  
180 185 190

Leu Gln Arg Ala Gly Gly Gln Ser Gln Phe Ser Ala Ser Leu Arg Gly  
195 200 205

Pro Ala Pro Arg Thr Pro Val Leu Arg Gln Val Gln Asp Ala Val Gln  
210 215 220

Ala Asp Pro Ala Ala Asp His Ser Leu Ala Ala Leu Ala Ala Arg Val  
225 230 235 240

Arg Val Ser Pro Arg His Leu Thr Arg Met Phe Arg Ala Glu Leu Asp  
245 250 255

Val Thr Pro Val Lys Tyr Val Glu Leu Ile Arg Phe Asp Ile Ala Lys  
260 265 270

Ala Leu Leu Asp Ser Gly His Asn Ala Thr Glu Ala Ala Ala Leu Ser  
275 280 285

Gly Phe Pro Ser Tyr Glu Ser Leu Arg Arg Ala Phe Ala Arg His Leu  
 290 295 300

Gly Leu Ser Pro Thr Arg Tyr Arg Gln Arg Phe Ala Thr Thr Val Pro  
 305 310 315 320

Asp Ala Gly Pro Arg Pro Asp Gly Gly  
 325

<210> 26  
 <211> 276  
 <212> PRT  
 <213> Streptomyces parvulus Tu4055

<400> 26  
 Met Gly Thr Val Thr Thr Ser Asp Gly Thr Ser Ile Phe Tyr Lys Asp  
 1 5 10 15

Trp Gly Pro Arg Asp Ala Pro Pro Ile Val Phe His His Gly Trp Pro  
 20 25 30

Leu Thr Ala Asp Asp Trp Asp Asn Gln Met Leu Phe Phe Leu Ser His  
 35 40 45

Gly Tyr Arg Val Ile Ala His Asp Arg Arg Gly His Gly Arg Ser Gly  
 50 55 60

Gln Pro Ser Thr Gly His Glu Met Asp Thr Tyr Ala Ala Asp Val Ala  
 65 70 75 80

Ala Leu Thr Glu Ala Leu Asp Leu Arg Asp Ala Val His Ile Gly His  
 85 90 95

Ser Thr Gly Gly Gly Glu Val Ala Arg Tyr Val Ala Arg Ala Glu Pro  
 100 105 110

Gly Arg Val Ala Lys Ala Val Leu Val Gly Ala Val Pro Pro Val Met  
 115 120 125

Val Lys Ser Asp Ala Asn Pro Gly Gly Thr Pro Ile Glu Val Phe Asp  
 130 135 140

Gly Phe Arg Thr Ala Leu Ala Ala Asn Arg Ala Gln Phe Tyr Ile Asp  
 145 150 155 160

Val Pro Ser Gly Pro Phe Tyr Gly Phe Asn Arg Glu Gly Ala Lys Val  
 165 170 175

Ser Gln Gly Leu Ile Asp Asn Trp Trp Arg Gln Gly Met Ser Gly Ala  
 180 185 190

Ala Asn Ala His Tyr Glu Cys Ile Lys Ala Phe Ser Glu Thr Asp Phe  
 195 200 205

Thr Glu Asp Leu Lys Ala Ile Asp Val Pro Val Leu Val Ala His Gly  
 210 215 220

Thr Asp Asp Gln Val Val Pro Tyr Ala Asp Ser Ala Pro Leu Ser Val  
 225 230 235 240

Lys Leu Leu Lys Asn Gly Thr Leu Lys Ser Tyr Glu Gly Leu Pro His  
 245 250 255

Gly Met Leu Ser Thr His Pro Glu Val Val Asn Pro Asp Leu Leu Asp  
 260 265 270

Phe Val Arg Ser

275

<210> 27  
 <211> 185  
 <212> PRT  
 <213> Streptomyces parvulus Tu4055

<400> 27  
 Met Gly Val Met Ile Gly Pro Ala Gly Arg Glu Arg Asp Glu Gly Asp  
 1 5 10 15  
 His Val Thr Gln Gln Ala Pro Val Ala Thr Asp Glu Arg Arg Val Phe  
 20 25 30  
 Val Asp Lys Gln Thr Pro Gly Ala Tyr Lys Ala Phe Val Ala Ala Ala  
 35 40 45  
 Glu Ser Val Arg Glu Ala Ala Ala Ala Gly Leu Asp Arg Leu Leu  
 50 55 60  
 Val Glu Leu Val Asn Ile Arg Val Ser Gln Leu Asn Ala Cys Ala Tyr  
 65 70 75 80  
 Cys Leu Ser Leu His Thr Arg Ala Ala Leu Arg Ala Gly Glu Thr Thr  
 85 90 95  
 Gln Arg Leu Ala Val Leu Pro Ala Trp Arg Asp Thr Glu Leu Phe Thr  
 100 105 110  
 Ala Arg Glu Arg Ala Ala Leu Ala Leu Ala Glu Ala Thr Thr Arg Pro  
 115 120 125  
 Ala Asp Ala Ala Ala Gln Ser Ala Ala Tyr Ala Gln Ala Arg Gly Val  
 130 135 140  
 Leu Ser Asp Asp Glu Val Ser Ala Val Ile Trp Val Ala Ile Ser Ile  
 145 150 155 160  
 Asn Ala Phe Asn Arg Val Ser Val Leu Ser Lys His Pro Val Arg Gly  
 165 170 175  
 Ala Ala Pro Ala Pro Val Ser Pro Ala  
 180 185

<210> 28  
 <211> 324  
 <212> PRT  
 <213> Streptomyces parvulus Tu4055

<400> 28  
 Met Val Ser Asn Thr Glu Thr Arg Pro Ala Glu Met Arg Cys Gly Ala  
 1 5 10 15  
 Leu Glu Asp Glu Val Pro Ala Ala Gly Val Glu Val Leu Thr Ala Arg  
 20 25 30  
 Asp Val Pro Leu Gly Gly Pro Arg Ala Met Thr Val Arg Arg Thr Leu  
 35 40 45  
 Pro Gln Arg Ala Arg Thr Leu Ile Gly Ala Trp Cys Phe Ala Asp His  
 50 55 60  
 Tyr Gly Pro Asp Asp Val Ala Ala Ser Gly Gly Met Asp Val Ala Pro  
 65 70 75 80  
 His Pro His Ile Gly Leu Gln Thr Val Ser Trp Leu Phe Ser Gly Glu  
 85 90 95

Ile Glu His Arg Asp Ser Leu Gly Thr His Ala Phe Val Arg Pro Gly  
 100 105 110  
 Glu Leu Asn Leu Met Thr Gly Gly Phe Gly Ile Ala His Ser Glu Val  
 115 120 125  
 Ser Thr Pro Asp Thr Thr Val Leu His Gly Val Gln Leu Trp Val Ala  
 130 135 140  
 Leu Pro Glu Glu His Arg Asp Thr Gly Arg Asp Phe Gln His His Ala  
 145 150 155 160  
 Pro Ala Pro Val Ala Phe Asp Gly Gly Thr Ala Arg Val Phe Leu Gly  
 165 170 175  
 Ser Leu Ala Gly Asp Thr Ser Pro Val Ser Thr Phe Thr Pro Leu Leu  
 180 185 190  
 Gly Ala Glu Leu Thr Leu Val Pro Gly Gly Thr Ala Thr Leu Asp Val  
 195 200 205  
 Asp Pro Gly Phe Glu His Gly Val Leu Val Asp Ser Gly Asp Val Arg  
 210 215 220  
 Val Glu Gly Ala Val Val Arg Pro Ala Glu Leu Gly Tyr Val Ala Pro  
 225 230 235 240  
 Gly Arg Ala Thr Leu Thr Leu Thr Asn Glu Ser Ala Ala Pro Ala Arg  
 245 250 255  
 Leu Ile Leu Leu Gly Gly Pro Pro Phe Pro Glu Glu Ile Ile Met Trp  
 260 265 270  
 Trp Asn Phe Ile Gly Arg Ser His Asp Glu Ile Val Arg Ala Arg Glu  
 275 280 285  
 Asp Trp Met Lys Gly Asp Arg Phe Gly Glu Val His Gly Tyr Asp Gly  
 290 295 300  
 Ala Pro Leu Pro Ala Pro Glu Leu Pro Asn Ala Pro Leu Lys Pro Arg  
 305 310 315 320  
 Arg Arg Ala Arg

<210> 29  
 <211> 126  
 <212> PRT  
 <213> Streptomyces parvulus Tu4055

<400> 29  
 Met Val Pro Thr Met Leu Cys Met Val Ala Val Pro Glu Ser His Ser  
 1 5 10 15  
 Gly Trp Thr Phe Val Thr Asn His Ala Arg Val Leu Ala Ala Ile Ala  
 20 25 30  
 Asp Asn Pro Asn Val Arg Ile Arg Asp Ile Ala Ala His Cys Arg Leu  
 35 40 45  
 Thr Glu Arg Ala Val Gln Arg Ile Ile Ser Asp Leu Glu Gln Asp Gly  
 50 55 60  
 Tyr Leu Ser His Thr Arg Asp Gly Arg Ser Asn Ile Tyr Arg Val Glu  
 65 70 75 80  
 Pro Asp Lys Val Leu Arg His Pro Ala Glu Ala Gly Leu Thr Val Ala  
 85 90 95  
 94

Ala Leu Leu Ser Leu Leu Val Arg Asp Glu Thr Asp His Gly Arg Ser  
100 105 110

Ala Gly Pro Gly Ser Arg Pro Ala Arg Ser Ser Ala Ala Arg  
115 120 125

<210> 30  
<211> 127  
<212> PRT  
<213> Streptomyces parvulus Tu4055

<400> 30  
Met Ser Leu Asp Glu Ala Val Ala Gly Cys Ser Arg His Thr Gly Arg  
1 5 10 15

Arg Arg Leu Pro Ala Ala Glu Gln Pro Thr Gln Ala Gln Tyr Glu Ala  
20 25 30

His Gly Ala Trp Val Val Ser Ala Arg Gly Ala Tyr Asp Met Asn Ser  
35 40 45

Val Glu Pro Leu Ala Asp Ala Leu Lys Asp Ala Ala Glu Lys Ser Pro  
50 55 60

Lys Val Val Leu Asp Ala Ser Gly Ile Thr Phe Ala Asp Ser Thr Leu  
65 70 75 80

Leu Ser Leu Leu Ile Leu Thr His Gln Ala Thr Asp Phe Arg Val Ala  
85 90 95

Ala Pro Thr Trp Gln Val Met Arg Leu Met Gln Leu Thr Gly Val Asp  
100 105 110

Ala Phe Leu Lys Val Arg Ala Thr Val Glu Glu Ala Ala Thr Ala  
115 120 125

<210> 31  
<211> 82  
<212> PRT  
<213> Streptomyces parvulus Tu4055

<400> 31  
Met Ser Met Ile Leu Pro Ala Glu Lys Glu Leu Arg Ala Val Leu Ala  
1 5 10 15

Arg Phe Ala Gln Ala Arg Ile Asp His Asp Val Arg Pro Ser Gly Cys  
20 25 30

Thr Ser Arg Leu Leu Glu Asp Ala Thr Tyr Thr Leu Cys Val Met Thr  
35 40 45

Gly Ala Arg Thr Ala Glu Gln Ala Leu Arg Thr Ala Asp Glu Leu Leu  
50 55 60

Ala Gln Phe Ala Glu Arg Thr Ala Ala Pro Val Glu Asp Glu Ala Leu  
65 70 75 80

Ala Ala

<210> 32  
<211> 70  
<212> PRT  
<213> Streptomyces parvulus Tu4055

<400> 32  
Met Ser Asp Thr Arg Leu Arg Gln Arg Asp Glu Thr Ser Lys Gly Pro  
1 5 10 15  
95

Ala Thr Glu Ile Pro Ala Pro Gln Trp Arg Asp Leu Phe Leu Ala Pro  
20 25 30  
Asp Trp Gly Gly Thr Asp Glu Gln Val Ile Val Ala Glu Glu Ala Arg  
35 40 45  
Gly Pro Glu His Phe Thr Gly Ala Arg Arg Pro Arg Gly Gly Arg Arg  
50 55 60  
Ser Ser Arg Arg Ala Ala  
65 70

<210> 33  
<211> 172  
<212> PRT  
<213> Streptomyces parvulus Tu4055

<400> 33  
Met Arg Cys Ser His Arg Ala Gly Gly Val Gly Ala Arg Ala Trp Leu  
1 5 10 15  
Gly Gly Asn Val Ala Val Asp Met Gly Glu Thr Gly Leu Asp Gly Ser  
20 25 30  
Ser Thr Gln Arg Ala Pro Glu Gly Ala Asp Pro Arg Ala Ala Ser Val  
35 40 45  
Thr Tyr Arg Arg Glu Ala Leu Arg Ile Ala Asp Ala Arg His Phe Ala  
50 55 60  
Thr Asp Tyr Leu Thr Arg Ser Gln Arg Asp Leu Arg Ser Pro Val Pro  
65 70 75 80  
Glu Arg Ala Ser Glu Ala Val His Leu Val Val Ser Glu Leu Ile Thr  
85 90 95  
Asn Ala Val Lys Tyr Gly Ala Asp Pro Ile Glu Leu Thr Leu Ser Leu  
100 105 110  
Thr Asp Asp Ala Val Thr Val Thr Val Arg Asp Gly Asp Thr Thr Leu  
115 120 125  
Pro Ala Pro Arg Pro Ala Asp Pro Ala Arg Val Gly Gln His Gly Leu  
130 135 140  
Glu Ile Val Ala Ala Leu Ser Gln Ala Val Glu Ile Arg Pro Glu Pro  
145 150 155 160  
Ser Gly Lys Arg Ile Thr Ala Arg Ile Ala Leu Thr  
165 170

<210> 34  
<211> 105  
<212> PRT  
<213> Streptomyces parvulus Tu4055

<400> 34  
Met Gln Ser Ser Ser Ala Ser Val Arg Gly Glu Ile Val Ile Arg Arg  
1 5 10 15  
Ala Val Ala Arg Asp Ala Lys Arg Leu Ser Arg Leu Val Arg Gly Ser  
20 25 30  
Arg Ala Tyr Glu Gly Pro Tyr Ala Ala Met Val Ser Asp Tyr Arg Val  
35 40 45  
Gly Pro Asp Tyr Ile Glu Asn His Gln Val Phe Val Ala Ser Thr Pro  
96



50                      55                      60  
 Arg Thr Pro Arg Thr Gly Cys Ser Ala Ser Thr Arg Cys Ser Ser Arg  
 65                      70                      75                      80  
 Arg Arg Ser Trp Thr Cys Cys Ser Ser Arg Thr Val Pro Arg Ala Ala  
 85                      90                      95  
 Ala Ser Asp Gly Cys Leu Ser Ile Thr  
 100                      105

<210> 35  
 <211> 638  
 <212> PRT  
 <213> Streptomyces parvulus Tu4055

<400> 35  
 Met Ala Gln Arg Arg Thr Pro Phe Gly Asp Arg Ala Arg Tyr Trp Phe  
 1                      5                      10                      15  
 Asp Ser Thr Leu Ala Arg Gly Ala Ala Ala Leu Val Gly Trp Met Ala  
 20                      25                      30  
 Leu Leu Ser Leu Ala Val Val Val Pro Ala Ser Ala Val Met Val Trp  
 35                      40                      45  
 Thr Asp Pro Asp Ala Pro Pro Ser Leu Ala Glu Arg Leu Ala Glu Val  
 50                      55                      60  
 Trp Arg Leu Thr Gly Glu Thr Leu Arg Leu Gly Gly Ala Thr Gly Thr  
 65                      70                      75                      80  
 Pro Leu Arg Ala Met Leu Ser Val Leu Leu Ala Leu Val Thr Leu Leu  
 85                      90                      95  
 Tyr Val Ser Thr Leu Val Gly Leu Ile Thr Thr Ala Leu Thr Glu Arg  
 100                      105                      110  
 Leu Thr Ser Leu Arg Arg Gly Arg Ser Thr Val Leu Glu Gln Gly His  
 115                      120                      125  
 Ala Val Val Leu Gly Trp Ser Glu Gln Val Phe Thr Val Val Ser Glu  
 130                      135                      140  
 Leu Val Ala Ala Asn Val Asn Gln Arg Gly Ala Ala Val Val Val Leu  
 145                      150                      155                      160  
 Ala Asp Arg Asp Lys Thr Val Met Glu Glu Ser Leu Gly Thr Lys Val  
 165                      170                      175  
 Gly Ser Cys Gly Gly Thr Arg Leu Ile Cys Arg Ser Gly Pro Thr Thr  
 180                      185                      190  
 Asp Pro Ala Val Leu Pro Leu Thr Ser Pro Ala Thr Ala Gly Val Val  
 195                      200                      205  
 Leu Val Leu Pro Pro Asp Glu Pro His Ala Asp Ala Glu Val Val Lys  
 210                      215                      220  
 Thr Leu Leu Ala Leu Arg Ala Ala Leu Ala Gly Ala Lys Pro Arg Pro  
 225                      230                      235                      240  
 Pro Val Val Ala Ala Val Arg Asp Asp Arg Tyr Arg Leu Ala Ala Cys  
 245                      250                      255  
 Leu Ala Ala Gly Pro Asp Gly Val Val Leu Glu Ser Asp Thr Val Thr  
 260                      265                      270

Ala Arg Leu Ile Val Gln Ala Ala Arg Arg Pro Gly Ile Ser Leu Val  
 275 280 285  
 His Arg Glu Leu Leu Asp Phe Ala Gly Asp Glu Phe Tyr Leu Ile Ser  
 290 295 300  
 Glu Pro Ala Leu Thr Gly Arg Pro Phe Gly Glu Val Leu Leu Ser Tyr  
 305 310 315 320  
 Ser Thr Thr Ser Val Val Gly Leu Met Arg Gly Cys Thr Pro Leu Leu  
 325 330 335  
 Asn Pro Pro Pro Thr Thr Pro Val Ala Pro Asp Asp Leu Leu Val Val  
 340 345 350  
 Ile Thr Gly Asp Asp Asp Thr Ala Arg Leu Asp Asp Cys Ala Glu Ser  
 355 360 365  
 Val Glu Lys Ala Ala Val Ala Ser Arg Pro Pro Thr Pro Ala Pro Ala  
 370 375 380  
 Glu Arg Ile Leu Leu Leu Gly Trp Asn Arg Arg Ala Pro Leu Val Val  
 385 390 395 400  
 Asp Gln Leu His Arg Arg Ala Arg Pro Gly Ser Ala Val Asp Val Val  
 405 410 415  
 Ala Glu Pro Gly Glu Ala Thr Ile Arg Glu Ile Ser Glu Ala Glu Ala  
 420 425 430  
 Asp Ser Gly Asn Gly Glu Asn Gly Gly Asn Gly Leu Ser Leu Ala Leu  
 435 440 445  
 His His Gly Asp Ile Thr Arg Pro Glu Thr Leu Arg Arg Leu Asp Val  
 450 455 460  
 His Ser Tyr Asp Ser Val Ile Val Leu Gly Arg Asp Pro Ala Pro Gly  
 465 470 475 480  
 Gln Pro Pro Asp Asp Pro Asp Asn Arg Thr Leu Val Thr Leu Leu Leu  
 485 490 495  
 Leu Arg Gln Leu Glu Glu Ala Thr Gly Arg Glu Leu Pro Val Val Thr  
 500 505 510  
 Glu Leu Ile Asp Asp Arg Asn Arg Ala Leu Ala Pro Ile Gly Pro Gly  
 515 520 525  
 Ala Asp Val Ile Ile Ser Gly Lys Leu Ile Gly Leu Leu Met Ser Gln  
 530 535 540  
 Ile Ser Gln Asn Arg His Leu Ala Ala Val Phe Glu Glu Leu Phe Ser  
 545 550 555 560  
 Ala Glu Gly Ala Gly Val Arg Leu Arg Pro Ala Thr Asp Tyr Leu Leu  
 565 570 575  
 Pro Gly Ser Thr Thr Ser Phe Ala Thr Val Val Ala Ala Ala Arg Arg  
 580 585 590  
 Arg Gly Glu Cys Ala Ile Gly Tyr Arg Asp His Ala Asp Ala Ser Thr  
 595 600 605  
 Arg Pro His Tyr Gly Val Arg Ile Asn Pro Pro Lys Arg Glu Arg Arg  
 610 615 620  
 Arg Trp Thr Ala Glu Asp Glu Val Val Val Ile Gly Thr Asp  
 98

625

630

635

<210> 36  
 <211> 165  
 <212> PRT  
 <213> Streptomyces parvulus Tu4055

<400> 36  
 Met Pro Ser Thr Asp Val Val Glu Leu Ile Leu Arg Asp His Arg Arg  
 1 5 10 15  
 Met Glu Glu Leu Phe Arg Thr Leu Arg Asn Val Glu Ala Asp Arg Ala  
 20 25 30  
 Ala Ala Leu Thr Glu Phe Ala Asp Leu Leu Ile Ala His Ala Ser Ala  
 35 40 45  
 Glu Glu Asp Glu Val Tyr Pro Ala Leu Arg Arg Tyr Lys Asn Val Glu  
 50 55 60  
 Gly Glu Asp Val Asp His Ser Val His Glu His His Glu Ala Asn Glu  
 65 70 75 80  
 Ala Leu Leu Ala Leu Leu Glu Val Glu Asp Thr Ala Ser Asp Glu Trp  
 85 90 95  
 Asp Asp Lys Leu Glu Glu Leu Val Thr Ala Val Asn His His Ala Asp  
 100 105 110  
 Glu Glu Glu Arg Thr Leu Leu Asn Asp Ala Arg Glu Asn Val Ala Asp  
 115 120 125  
 Asp Arg Arg Arg Glu Leu Gly Gln Lys Phe Gln Glu Ala Arg Ser Arg  
 130 135 140  
 Tyr Leu Glu Thr Gly Cys Gly Ser Val Glu Asn Val Arg Lys Leu Val  
 145 150 155 160  
 Ala Ala Ala Asp Asp  
 165

<210> 37  
 <211> 787  
 <212> PRT  
 <213> Streptomyces parvulus Tu4055

<400> 37  
 Met Ala Arg Arg Leu Thr Glu Gly Arg Thr Arg Arg Glu Lys Gly Glu  
 1 5 10 15  
 His Met Gln Lys Pro His Gly Glu Glu Ser Glu Thr Ser Leu Ser Val  
 20 25 30  
 Thr Pro Pro Lys Lys Trp Ala Ala Gly Val Pro Ala Val Val His Ala  
 35 40 45  
 Leu Glu Tyr Ser Leu Glu Gln Thr Ser Pro Arg Arg Thr Gly Val Asp  
 50 55 60  
 Leu Leu Thr Met Asn Gln Val Gly Gly Ile Asp Cys Pro Gly Cys Ala  
 65 70 75 80  
 Trp Ala Asp Pro Ala Pro Gly Arg Arg His Arg Asn Glu Tyr Cys Glu  
 85 90 95  
 Asn Gly Ala Lys His Ile Asn Asp Glu Ala Thr Thr Arg Arg Val Thr  
 100 105 110

Ala Asp Phe Phe Arg Glu His Ser Val Ala Asp Leu Ala Gly Arg Ser  
 115 120 125  
 Asp Met Trp Leu Asn Gln Gln Gly Arg Leu Thr Glu Pro Met Ile Lys  
 130 135 140  
 Arg Pro Gly Ser Ala His Tyr Glu Pro Ile Gly Trp Asn Asp Ala Leu  
 145 150 155 160  
 Gly Val Leu Ala Glu Glu Leu Lys Ser Leu Ala Ser Pro Asp Glu Ala  
 165 170 175  
 Val Phe Tyr Thr Ser Gly Arg Ala Ser Asn Glu Ala Ala Phe Val Leu  
 180 185 190  
 Gln Leu Phe Ala Arg Ala Phe Gly Thr Asn Asn Leu Pro Asp Cys Ser  
 195 200 205  
 Asn Met Cys His Glu Ser Ser Gly Phe Ala Leu Ser Glu Thr Leu Gly  
 210 215 220  
 Thr Gly Lys Gly Thr Val Gly Leu Asp Asp Leu His His Ala Asp Leu  
 225 230 235 240  
 Ile Phe Leu Val Gly Gln Asn Pro Gly Ser Asn His Pro Arg Gln Leu  
 245 250 255  
 Ser Ala Leu Glu Glu Ala Lys Arg Asn Gly Ala Arg Ile Val Ala Val  
 260 265 270  
 Asn Pro Leu Pro Glu Ala Gly Leu Arg Arg Phe Lys Asn Pro Gln Gln  
 275 280 285  
 Pro Arg Gly Val Val Gly Arg Gly Thr Arg Ile Ala Asp Arg Phe Leu  
 290 295 300  
 His Ile Lys Pro Gly Gly Asp Leu Ala Leu Phe Gln Ala Leu Asn Arg  
 305 310 315 320  
 Leu Leu Leu Glu Ala Glu Asp Ala Arg Pro Gly Thr Val Leu Asp His  
 325 330 335  
 Asp Phe Ile Asp Ala His Thr Thr Gly Phe Glu Glu Phe Ala Arg His  
 340 345 350  
 Ala Arg Thr Val Asp Trp Asp Asp Val Arg Ala Ala Thr Gly Leu Thr  
 355 360 365  
 Arg Glu Glu Ile Glu Lys Val Arg Asp Glu Val Leu Asp Ser Glu Arg  
 370 375 380  
 Val Val Val Cys Trp Ala Met Gly Ile Thr Gln His Lys His Gly Val  
 385 390 395 400  
 Pro Thr Val Arg Glu Ile Val Asn Phe Leu Met Leu Arg Gly Asn Leu  
 405 410 415  
 Gly Arg Ala Gly Thr Gly Ala Cys Pro Val Arg Gly His Ser Asn Val  
 420 425 430  
 Gln Gly Asp Arg Thr Met Gly Ile Trp Glu Gln Met Pro Asp Thr Phe  
 435 440 445  
 Leu Asp Ala Leu Arg Asp Glu Phe Gly Phe Glu Pro Pro Arg Ala His  
 450 455 460  
 Gly Leu Asp Ser Val Asn Ser Ile Lys Ala Met Arg Glu Gly Arg Val  
 465 470 475 480

Lys Val Phe Leu Ala Leu Ala Gly Asn Phe Val Arg Ala Ala Pro Asp  
 485 490 495  
 Ser Glu Val Thr Glu Glu Ala Met Arg Ser Cys Arg Leu Thr Ala His  
 500 505 510  
 Ile Ser Thr Lys Leu Asn Arg Ser His Thr Val Cys Gly Asp Thr Ala  
 515 520 525  
 Leu Ile Leu Pro Thr Leu Gly Arg Thr Glu Arg Asp Val Gln Ala Asp  
 530 535 540  
 Gly Glu Gln Phe Val Thr Val Glu Asn Ser Met Ser Glu Val His Thr  
 545 550 555 560  
 Ser Arg Gly Arg Leu Ala Pro Ala Ser Pro Met Leu Leu Ser Glu Ile  
 565 570 575  
 Ala Ile Leu Cys Arg Leu Ala Arg Leu Thr Leu Asp Gly Arg Val Glu  
 580 585 590  
 Ile Pro Trp Glu Thr Phe Glu Gly Asp Tyr His Thr Ile Arg Asp Arg  
 595 600 605  
 Ile Ala Arg Ile Val Pro Gly Phe His Asp Phe Asn Ala Arg Val Thr  
 610 615 620  
 Arg Pro Gly Gly Phe Gln Leu Pro Asn Pro Val Asn Glu Gly Val Phe  
 625 630 635 640  
 Asn Thr Glu Val Gly Lys Ala Leu Phe Thr Arg Asn Glu Ser Val Val  
 645 650 655  
 Pro Arg Ala Pro Glu Gly His Leu Leu Leu Gln Thr Leu Arg Ser His  
 660 665 670  
 Asp Gln Trp Asn Thr Val Pro Tyr Thr Asp Asn Asp Arg Tyr Arg Gly  
 675 680 685  
 Ile His Gly Ser Arg His Val Val Leu Val Asn Pro Ala Asp Leu Ser  
 690 695 700  
 Glu Leu Gly Leu Ala Gln Gly Asp Arg Val Asp Leu Val Ser Val Trp  
 705 710 715 720  
 Ala Asp Gly Thr Glu Arg Arg Ala Glu Asn Phe Gln Val Val Pro Tyr  
 725 730 735  
 Pro Ala Ala Lys Gly Ser Ala Ala Ala Tyr Tyr Pro Glu Thr Asn Val  
 740 745 750  
 Leu Val Pro Leu Asp Ser Val Ala Asp Ile Ser Asn Gln Pro Thr Ser  
 755 760 765  
 Lys Gly Ile Val Val Arg Leu Glu Pro Val Pro Asp Arg Thr Gln Pro  
 770 775 780  
 Ser Pro Ala  
 785

<210> 38  
 <211> 206  
 <212> PRT  
 <213> Streptomyces parvulus Tu4055

<400> 38  
 Met Ala Glu Gln His Glu Gly Pro Arg Ala Val Pro Asp Thr Pro Gly  
 101

1	5	10	15
Ala Arg Thr Ser Gly Asp Arg Ser Thr Gly Arg Arg Pro Leu Arg Glu	20	25	30
Arg His Val Asp Gln Thr Val Glu Val Ala Val Pro Val Arg Thr Ala	35	40	45
Tyr Asn Gln Trp Thr Gln Phe Lys Ser Phe Pro Arg Phe Ser Ala Val	50	55	60
Val Arg Asp Val Glu Gln Val Arg Pro Thr Val Thr Ala Trp Thr Leu	65	70	75
Gly Tyr Gly Pro Leu Arg Arg Arg Phe Ala Val Glu Ile Leu Glu Gln	85	90	95
Asp Pro Asp Ala Tyr Leu Ala Trp Arg Gly Leu Glu Gln Arg Pro Trp	100	105	110
His Arg Gly Glu Val Glu Phe Arg Pro Thr Glu Ser Gly Gly Thr Ala	115	120	125
Ile Thr Val Arg Val Leu Leu Glu Pro Arg Gly Ala Ala Arg Ile Leu	130	135	140
Thr Arg Ser Ser Arg Ala Val Arg Leu Thr Thr Arg Leu Val His Gly	145	150	155
Glu Leu Thr Arg Phe Lys Arg Phe Met Glu Gly Leu Gly Gln Glu Gly	165	170	175
Gly Ala Trp Arg Gly Thr Ile Arg Asn Gly Arg Val Gln His Asp Arg	180	185	190
Pro Glu Pro Pro Arg Ser Arg Val Ala Arg Trp Pro Val Gly	195	200	205

<210> 39  
 <211> 251  
 <212> PRT  
 <213> Streptomyces parvulus Tu4055

Met Leu Leu Leu Ile Ser Pro Asp Gly Val Glu Glu Ala Leu Asp Cys	1	5	10	15
Ala Lys Ala Ala Glu His Leu Asp Ile Val Asp Val Lys Lys Pro Asp	20	25	30	
Glu Gly Ser Leu Gly Ala Asn Phe Pro Trp Val Ile Arg Glu Ile Arg	35	40	45	
Asp Ala Val Pro Ala Asp Lys Pro Val Ser Ala Thr Val Gly Asp Val	50	55	60	
Pro Tyr Lys Pro Gly Thr Val Ala Gln Ala Ala Leu Gly Ala Val Val	65	70	75	80
ser Gly Ala Thr Tyr Ile Lys Val Gly Leu Tyr Gly Cys Thr Thr Pro	85	90	95	
Glu Gln Gly Ile Ala Val Met Arg Ala Val Val Arg Ala Val Lys Asp	100	105	110	
His Arg Pro Glu Ala Leu Val Val Ala Ser Gly Tyr Ala Asp Ala His	115	120	125	

Arg Ile Gly Cys Val Asn Pro Leu Ala Leu Pro Asp Ile Ala Ala Arg  
 130 135 140  
 Ser Gly Ala Asp Ala Ala Met Leu Asp Thr Ala Val Lys Asp Gly Thr  
 145 150 155 160  
 Arg Leu Phe Asp His Val Pro Pro Asp Thr Cys Ala Glu Phe Val Arg  
 165 170 175  
 Arg Ala His Ala Ala Gly Leu Leu Ala Ala Leu Ala Gly Ser Val Arg  
 180 185 190  
 Gln Thr Asp Leu Gly Arg Leu Thr Arg Ile Gly Thr Asp Ile Val Gly  
 195 200 205  
 Val Arg Gly Ala Val Cys Glu Gly Gly Asp Arg Asn Ala Gly Arg Ile  
 210 215 220  
 Arg Pro His Leu Val Ala Ala Phe Arg Ser Glu Met Asp Arg His Ala  
 225 230 235 240  
 Arg Glu His Arg Ala Gly Val Thr Thr Ala Ser  
 245 250

<210> 40  
 <211> 467  
 <212> PRT  
 <213> Streptomyces parvulus Tu4055

<400> 40  
 Met Pro Thr Pro Ala Pro Asp His Ala Pro Ala Gln Arg Ala Ala Pro  
 1 5 10 15  
 Leu Ala Val Val Asp Pro Ala Thr Gly Thr Val Phe Asp Glu Ala Pro  
 20 25 30  
 Asp Gln Gly Pro Asp Val Leu Asp Ala Val Val Asp Arg Ala Arg Arg  
 35 40 45  
 Ala Trp His Gly Trp Arg Ala Asp Pro Asp Ala Arg Thr Thr Ala Leu  
 50 55 60  
 Arg Ser Ala Ala Asp Ala Val Glu Ala Ala Gly Asp Asp Leu Ala Arg  
 65 70 75 80  
 Leu Leu Thr Arg Glu Gln Gly Lys Pro Leu Ala Glu Ser His Ala Glu  
 85 90 95  
 Val Ala Arg Thr Ala Ala Arg Leu Arg Tyr Phe Ala Gly Leu Ala Pro  
 100 105 110  
 Arg Thr Arg Arg Ile Thr Asp Gly Arg Pro Val Arg Ser Glu Val Arg  
 115 120 125  
 Trp Arg Pro Leu Gly Pro Val Ala Ala Ile Val Pro Trp Asn Phe Pro  
 130 135 140  
 Leu Gln Leu Ala Ser Ala Lys Phe Ala Pro Ala Leu Ala Ala Gly Asn  
 145 150 155 160  
 Thr Met Val Leu Lys Pro Ser Pro Phe Thr Pro Leu Ala Thr Arg Leu  
 165 170 175  
 Leu Gly Ser Val Leu Ala Thr Ala Leu Pro Glu Asp Val Leu Thr Val  
 180 185 190  
 Val Thr Gly Arg Glu Pro Leu Gly Ala Arg Leu Ala Ala His Pro Gly  
 195 200 205

Ile Arg His Val Thr Phe Thr Gly Ser Val Pro Thr Gly Arg Ala Val  
 210 215 220  
 Ala Arg Ala Ala Ala Ala Ser Leu Ala Arg Val Thr Leu Glu Leu Gly  
 225 230 235 240  
 Gly Asn Asp Ala Ala Val Leu Leu Asp Asp Val Glu Val Asp Arg Ile  
 245 250 255  
 Ala Asp Arg Leu Phe Trp Ala Ala Phe Arg Asn Cys Gly Gln Val Cys  
 260 265 270  
 Met Ala Val Lys Arg Val Tyr Ala Pro Ala Arg Leu His Ala Gln Val  
 275 280 285  
 Val Glu Ala Leu Thr Glu Arg Ala Lys Ala Val Ala Val Gly Pro Gly  
 290 295 300  
 Leu Asp Pro Arg Thr Arg Leu Gly Pro Val Ala Asn Ala Pro Gln Leu  
 305 310 315 320  
 Ala Arg Val Glu Gln Ile Thr Arg Arg Ala Leu Ala Asp Gly Ala Arg  
 325 330 335  
 Ala Ala Ala Gly Gly His Arg Leu Asp Gly Pro Gly Cys Phe Phe Ala  
 340 345 350  
 Pro Thr Ile Leu Thr Asp Val Pro Pro Asp Ser Pro Val Val Thr Glu  
 355 360 365  
 Glu Gln Phe Gly Pro Val Leu Pro Val Leu Pro Tyr Arg Ser Leu Asp  
 370 375 380  
 Glu Ala Val Asp Ala Ala Asn Gly Thr Gly Phe Gly Leu Gly Gly Ser  
 385 390 395 400  
 Val Trp Gly Thr Asp Leu Asp Arg Ala Glu Ala Val Ala Asp Arg Leu  
 405 410 415  
 Glu Cys Gly Thr Ala Trp Val Asn His His Ala Glu Leu Ser Leu Ala  
 420 425 430  
 Gln Pro Phe Ala Gly Asp Lys Asp Ser Gly Val Gly Val Ala Gly Gly  
 435 440 445  
 Pro Trp Gly Leu Tyr Gly Asn Leu Arg Pro Phe Val Val His Arg Pro  
 450 455 460  
 Arg Gly Glu  
 465

<210> 41  
 <211> 368  
 <212> PRT  
 <213> Streptomyces parvulus Tu4055

<400> 41  
 Met Ser Phe Arg Ala Ala Val Leu Arg Gly Tyr Glu Asp Pro Phe Thr  
 1 5 10 15  
 Val Glu Glu Val Thr Leu Gly Thr Glu Pro Gly Ala Gly Glu Ile Leu  
 20 25 30  
 Val Glu Ile Ala Gly Cys Gly Met Cys Arg Thr Asp Leu Ala Val Arg  
 35 40 45  
 Arg Ser Ala Gly Arg Ser Pro Leu Pro Ala Val Leu Gly His Glu Gly  
 104



50					55					60					
Ser 65	Gly	Val	Val	Val	Arg 70	Thr	Gly	Gly	Gly	Pro 75	Asp	Thr	Ala	Ile	Gly 80
Val	Gly	Asp	His	Val 85	Val	Leu	Ser	Phe	Asp 90	Ser	Cys	Gly	His	Cys 95	Arg
Asn	Cys	Arg	Ala 100	Ala	Ala	Pro	Ala	Tyr 105	Cys	Asp	Ser	Phe	Ala 110	Ser	Leu
Asn	Leu	Phe 115	Gly	Gly	Arg	Ala	Glu 120	Asp	Pro	Pro	Arg	Leu 125	Thr	Asp	Gly
Ser	Gly 130	Ala	Ala	Leu	Ala	Pro 135	Arg	Trp	Phe	Gly	Gln 140	Ser	Ala	Phe	Ala
Glu 145	Tyr	Ala	Leu	Val	Ser 150	Ala	Arg	Asn	Ala	Val 155	Arg	Val	Asp	Pro	Ala 160
Leu	Pro	Val	Glu	Leu 165	Leu	Gly	Pro	Leu	Gly 170	Cys	Gly	Phe	Leu	Thr 175	Gly
Ala	Gly	Ala	Val 180	Leu	Asn	Thr	Phe	Ala 185	Ala	Gly	Pro	Gly	Asp 190	Thr	Leu
Val	Val	Leu 195	Gly	Ala	Gly	Ala	Val 200	Gly	Leu	Ala	Ala	Val 205	Met	Ala	Ala
Thr	Ala 210	Ala	Gly	Ala	Pro	Ser 215	Val	Ala	Val	Asp	Arg 220	Asn	Pro	Arg	Arg
Leu 225	Glu	Leu	Ala	Glu	Arg 230	Phe	Gly	Ala	Val	Pro 235	Leu	Pro	Ala	Ala	Thr 240
Ala	Gly	Leu	Ala	Glu 245	Arg	Ile	Arg	Arg	Leu 250	Thr	Asp	Gly	Gly	Ala 255	Arg
Tyr	Ala	Leu	Asp 260	Thr	Thr	Ala	Ser	Val 265	Pro	Leu	Ile	Asn	Glu 270	Ala	Leu
Arg	Ala	Leu 275	Arg	Pro	Thr	Gly	Ala 280	Leu	Gly	Leu	Val	Ala 285	Arg	Leu	His
Thr	Ala 290	Leu	Pro	Leu	Glu	Pro 295	Gly	Thr	Leu	Asp	Arg 300	Gly	Arg	Ser	Ile
Arg 305	His	Val	Cys	Glu	Gly 310	Asp	Ala	Val	Pro	Gly 315	Leu	Leu	Ile	Pro	Gln 320
Leu	Thr	Arg	Leu	Trp 325	Gln	Ala	Gly	Arg	Phe 330	Pro	Phe	Asp	Gln	Leu 335	Val
Arg	Thr	Tyr	Pro 340	Leu	Ala	Asp	Ile	Asn 345	Glu	Ala	Glu	Arg	Asp 350	Cys	Asp
Ala	Gly	Leu 355	Val	Val	Lys	Pro	Val 360	Leu	Leu	Pro	Pro	Ala 365	Arg	Ser	Arg

<210> 42  
 <211> 301  
 <212> PRT  
 <213> Streptomyces parvulus Tu4055

<400> 42  
 Met Thr Gly Thr Ala Pro Gln Tyr Thr Asp Val Glu Gly Val Asn Gly  
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Gly Val Gly Leu Thr Ala Phe Leu Val Ala Ala Ala Arg Ala Ile Glu  
                   20                  25                  30  
 Thr His Arg Asp Asp Ser Leu Ala Gln Asp Val Tyr Ala Glu His Phe  
                   35                  40                  45  
 Val Arg Ala Ala Pro Ala Cys Ala Asp Trp Pro Val Arg Ile Glu Gln  
                   50                  55                  60  
 Val Pro Asp Gly Asp Gly Asn Pro Leu Trp Gly Arg Phe Ala Arg Tyr  
                   65                  70                  75                  80  
 Phe Gly Leu Arg Thr Arg Ala Leu Asp Asp Phe Leu Leu Arg Ser Val  
                   85                  90                  95  
 Arg Thr Gly Pro Arg Gln Val Val Leu Leu Gly Ala Gly Leu Asp Thr  
                   100                  105                  110  
 Arg Ala Phe Arg Leu Asp Trp Pro Ser Gln Cys Ala Val Phe Glu Ile  
                   115                  120                  125  
 Asp Arg Thr Gly Val Leu Ala Phe Lys Gln Gln Val Leu Thr Asp Leu  
                   130                  135                  140  
 Ala Ala Thr Pro Arg Val Glu Arg Val Pro Val Pro Val Asp Leu Arg  
                   145                  150                  155                  160  
 Ala Asp Trp Ala Gly Ala Leu Thr Ala Ala Gly Phe Asp Pro Ala Ala  
                   165                  170                  175  
 Pro Ser Val Trp Leu Ala Glu Gly Leu Leu Phe Tyr Leu Pro Gly Pro  
                   180                  185                  190  
 Ala Glu Ser Leu Leu Val Asp Thr Val Asp Arg Leu Thr Thr Asp Gly  
                   195                  200                  205  
 Ser Ala Leu Ala Phe Glu Ala Lys Leu Glu Lys Asp Leu Leu Ala Tyr  
                   210                  215                  220  
 Arg Asp Ser Ala Ile Tyr Thr Ala Thr Arg Glu Gln Ile Gly Ile Asp  
                   225                  230                  235                  240  
 Leu Leu Arg Leu Phe Asp Lys Gly Pro Arg Pro Asp Ser Ala Gly Glu  
                   245                  250                  255  
 Leu Ala Ala Arg Gly Trp Ser Thr Ser Met His Thr Pro Phe Val Phe  
                   260                  265                  270  
 Thr His Arg Tyr Gly Arg Gly Pro Leu Pro Glu Pro Asn Asp Ala Leu  
                   275                  280                  285  
 Glu Gly Asn Arg Trp Val Phe Ala Arg Lys Pro Gly Pro  
                   290                  295                  300

<210> 43  
 <211> 179  
 <212> PRT  
 <213> Streptomyces parvulus Tu4055

<400> 43  
 Met Cys Met Arg Asp Glu Ala Ala Lys Arg Val Glu Leu Val Phe Ser  
   1                  5                  10                  15  
 Leu Phe Asp Ala Asn Gly Asn Gly Val Ile Asp Ser Asp Asp Phe Asp  
                   20                  25                  30  
 Leu Met Thr Asp Arg Val Val Ala Ala Ala Ala Gly Ser Asp Asp Ser  
                   35                  40                  45

Ala Lys Ala Ala Val Arg Ala Ala Phe Arg Arg Tyr Trp Thr Thr Leu  
50 55 60  
Ala Thr Glu Leu Asp Ala Asp Gly Asp Gly Val Ile Thr Val Glu Glu  
65 70 75 80  
Phe Arg Pro Phe Val Leu Asp Pro Glu Arg Phe Gly Pro Thr Ile Ala  
85 90 95  
Glu Phe Ala Arg Ala Leu Ser Ala Leu Gly Asp Pro Asp Gly Asp Gly  
100 105 110  
Leu Ile Glu Arg Pro Leu Phe Val Ala Leu Met Lys Ala Ile Gly Phe  
115 120 125  
Glu Glu Ala Asn Ile His Ala Leu Phe Asp Ala Phe Ala Pro Asp Ala  
130 135 140  
Ala Asp Arg Ile Thr Val Ala Ala Trp Ala Ser Gly Ile Glu Asp Tyr  
145 150 155 160  
Tyr Ala Pro Asp Leu Ala Gly Ile Pro Gly Asp Arg Leu Val Ala Ala  
165 170 175

Arg Thr Val

<210> 44  
<211> 33  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: oligo CM410

<400> 44  
aaaatgcatt cggcctgaac ggccccgctg tca 33

<210> 45  
<211> 33  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: oligo CM411

<400> 45  
aaatggccag cgaacaccaa caccacacca cca 33

<210> 46  
<211> 32  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: oligo CM412

<400> 46  
aaagtcctag gcggcggccg gcgggtcgac ct 32

<210> 47  
<211> 35  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: oligo CM413

<400> 47	
tttagatctc gcgacgtcgc acgcgccgaa cgtca	35
<210> 48	
<211> 34	
<212> DNA	
<213> Artificial Sequence	
<220>	
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<400> 48	
aaactgcaga gtcgaacatc ggtcacacgc aggc	34
<210> 49	
<211> 35	
<212> DNA	
<213> Artificial Sequence	
<220>	
<223> Description of Artificial Sequence: oligo CM415	
<400> 49	
aaaatgcatg atccacatcg atacgacgcg cccga	35
<210> 50	
<211> 36	
<212> DNA	
<213> Artificial Sequence	
<220>	
<223> Description of Artificial Sequence: oligo CM416	
<400> 50	
taaatgcatt ccattcggtg caggtggagt tgatcc	36
<210> 51	
<211> 36	
<212> DNA	
<213> Artificial Sequence	
<220>	
<223> Description of Artificial Sequence: oligo CM417	
<400> 51	
ataggatccc ctccgggtgc tccagaccgg ccaccc	36
<210> 52	
<211> 35	
<212> DNA	
<213> Artificial Sequence	
<220>	
<223> Description of Artificial Sequence: oligo CM368	
<400> 52	
tttcctgcag gccatcccca cgatcgcgat cggct	35
<210> 53	
<211> 35	
<212> DNA	
<213> Artificial Sequence	
<220>	
<223> Description of Artificial Sequence: oligo CM369	
<400> 53	
tttcatatga caggcagtgc tgtttcggcc ccatt	35

<210> 54  
 <211> 36  
 <212> DNA  
 <213> Artificial Sequence  
  
 <220>  
 <223> Description of Artificial Sequence: oligo CM370  
  
 <400> 54  
 ttccatatgg cggatgccgt acgtgccgcc ggcgct 36  
  
 <210> 55  
 <211> 32  
 <212> DNA  
 <213> Artificial Sequence  
  
 <220>  
 <223> Description of Artificial Sequence: oligo CM371  
  
 <400> 55  
 ttccatatgc cccaggcgat cgtccgcacc ac 32  
  
 <210> 56  
 <211> 41  
 <212> DNA  
 <213> Artificial Sequence  
  
 <220>  
 <223> Description of Artificial Sequence: oligo CM372  
  
 <400> 56  
 ttccatatgg tctcggcccc ccacacaaga gccctccggg c 41  
  
 <210> 57  
 <211> 20  
 <212> DNA  
 <213> Artificial Sequence  
  
 <220>  
 <223> Description of Artificial Sequence: oligo B1819A  
  
 <400> 57  
 gtcattcatg cggcgggctc 20  
  
 <210> 58  
 <211> 20  
 <212> DNA  
 <213> Artificial Sequence  
  
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 <223> Description of Artificial Sequence: oligo B1819B  
  
 <400> 58  
 ggtctagaac ggccgaactt 20  
  
 <210> 59  
 <211> 20  
 <212> DNA  
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 <220>  
 <223> Description of Artificial Sequence: oligo B1819C  
  
 <400> 59  
 gttctagaac ctcggtcggc 20  
  
 <210> 60

<211> 20  
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 <220>  
 <223> Description of Artificial Sequence: oligo B1819D  
  
 <400> 60  
 ctggatcca cgctgctgcg 20  
  
 <210> 61  
 <211> 19  
 <212> DNA  
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 <220>  
 <223> Description of Artificial Sequence: oligo BLDA  
  
 <400> 61  
 ggagacttac gggggatgc 19  
  
 <210> 62  
 <211> 19  
 <212> DNA  
 <213> Artificial Sequence  
  
 <220>  
 <223> Description of Artificial Sequence: oligo BLDB  
  
 <400> 62  
 ctccagcagc gaccagaac 19  
  
 <210> 63  
 <211> 20  
 <212> DNA  
 <213> Artificial Sequence  
  
 <220>  
 <223> Description of Artificial Sequence: oligo B19A  
  
 <400> 63  
 cccatgcatc accgacatac 20  
  
 <210> 64  
 <211> 20  
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 <400> 64  
 gcgatatccc gaagaacgcg 20  
  
 <210> 65  
 <211> 20  
 <212> DNA  
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 <223> Description of Artificial Sequence: oligo B1920A  
  
 <400> 65  
 gccaaagcttc ctgcacgcgc 20  
  
 <210> 66  
 <211> 20  
 <212> DNA

<213> Artificial Sequence  
 <220>  
 <223> Description of Artificial Sequence: oligo B1920B  
 <400> 66  
 cactagtgcc tcacccagtt 20  
 <210> 67  
 <211> 20  
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 <223> Description of Artificial Sequence: oligo B1920C  
 <400> 67  
 cactagtgcac ggccgaagcg 20  
 <210> 68  
 <211> 20  
 <212> DNA  
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 <223> Description of Artificial Sequence: oligo B1920D  
 <400> 68  
 tcggatccgt cagaccgttc 20  
 <210> 69  
 <211> 36  
 <212> DNA  
 <213> Artificial Sequence  
 <220>  
 <223> Description of Artificial Sequence: oligo CM384  
 <400> 69  
 aacctgcagg taccccgggtg ggggtgcggtc gcccgga 36  
 <210> 70  
 <211> 24  
 <212> DNA  
 <213> Artificial Sequence  
 <220>  
 <223> Description of Artificial Sequence: oligo CM385  
 <400> 70  
 cgccgcacgc gtcgaagcca acga 24  
 <210> 71  
 <211> 24  
 <212> DNA  
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 <220>  
 <223> Description of Artificial Sequence: oligo CM386  
 <400> 71  
 tgtgggctgg tcgttgctt cgac 24  
 <210> 72  
 <211> 34  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> Description of Artificial Sequence: oligo CM387  
 <400> 72  
 ggtgcctgca gcgtgagttc ctcgacggat ccga 34  
 <210> 73  
 <211> 26  
 <212> DNA  
 <213> Artificial Sequence  
 <220>  
 <223> Description of Artificial Sequence: oligo CM388  
 <400> 73  
 gaggaactca ccctgcaggc accgct 26  
 <210> 74  
 <211> 26  
 <212> DNA  
 <213> Artificial Sequence  
 <220>  
 <223> Description of Artificial Sequence: oligo CM395  
 <400> 74  
 cgaacgtcca gccctcgggc atgcgt 26  
 <210> 75  
 <211> 28  
 <212> DNA  
 <213> Artificial Sequence  
 <220>  
 <223> Description of Artificial Sequence: oligo CM396  
 <400> 75  
 tggcacgcat gcccgagggc tggacgtt 28  
 <210> 76  
 <211> 35  
 <212> DNA  
 <213> Artificial Sequence  
 <220>  
 <223> Description of Artificial Sequence: oligo CM397  
 <400> 76  
 tttcctgcag gccatgccga cgatcgcgac aggct 35  
 <210> 77  
 <211> 36  
 <212> DNA  
 <213> Artificial Sequence  
 <220>  
 <223> Description of Artificial Sequence: oligo CM398  
 <400> 77  
 aaacatatgg tcctggcgct gcgcaacggg gaactg 36  
 <210> 78  
 <211> 35  
 <212> DNA  
 <213> Artificial Sequence  
 <220>



<223> Description of Artificial Sequence: oligo CM399  
 <400> 78  
 tttcctgcag gcatgccga cgatggcgat gggct 35  
 <210> 79  
 <211> 43  
 <212> DNA  
 <213> Artificial Sequence  
 <220>  
 <223> Description of Artificial Sequence: oligo CM400  
 <400> 79  
 aaacctgcag gttccccggc gacgtggact cgccggagtc gtt 43  
 <210> 80  
 <211> 41  
 <212> DNA  
 <213> Artificial Sequence  
 <220>  
 <223> Description of Artificial Sequence: oligo CM401  
 <400> 80  
 ttttctagag cgacgtcgca ggcggcgatg gtcacgccc g t 41  
 <210> 81  
 <211> 20  
 <212> DNA  
 <213> Artificial Sequence  
 <220>  
 <223> Description of Artificial Sequence: oligo B25A  
 <400> 81  
 ttctgcagcc gcggccttcg 20  
 <210> 82  
 <211> 20  
 <212> DNA  
 <213> Artificial Sequence  
 <220>  
 <223> Description of Artificial Sequence: oligo B25B  
 <400> 82  
 agaattcgcc ggcgccgctg 20  
 <210> 83  
 <211> 20  
 <212> DNA  
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 <223> Description of Artificial Sequence: oligo B7T1  
 <400> 83  
 ggctgcagac gcggtgaag 20  
 <210> 84  
 <211> 20  
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 <223> Description of Artificial Sequence: oligo B7T2

<400> 84	
ccggatccca gagccacgtc	20
<210> 85	
<211> 20	
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<223> Description of Artificial Sequence: oligo BP4501	
<400> 85	
cgtatgcatg gcgccatgga	20
<210> 86	
<211> 20	
<212> DNA	
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<400> 86	
agccaattgg tgcactccag	20
<210> 87	
<211> 20	
<212> DNA	
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<400> 87	
gtcatgcatc agcgacccg	20
<210> 88	
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<223> Description of Artificial Sequence: oligo BNHT2	
<400> 88	
gtgcaattgc cctggtagtc	20
<210> 89	
<211> 20	
<212> DNA	
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<223> Description of Artificial Sequence: oligo BTRNAS1	
<400> 89	
tgtctagact cgcggaaca	20
<210> 90	
<211> 20	
<212> DNA	
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<220>	
<223> Description of Artificial Sequence: oligo BTRNAS2	
<400> 90	
tgaattccga agggggtggt	20

<210> 91  
 <211> 20  
 <212> DNA  
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 <220>  
 <223> Description of Artificial Sequence: oligo B5B  
  
 <400> 91  
 aactagtccg cagtggaccg 20  
  
 <210> 92  
 <211> 20  
 <212> DNA  
 <213> Artificial Sequence  
  
 <220>  
 <223> Description of Artificial Sequence: oligo B5A  
  
 <400> 92  
 tcgatatcct caccgcccgt 20  
  
 <210> 93  
 <211> 20  
 <212> DNA  
 <213> Artificial Sequence  
  
 <220>  
 <223> Description of Artificial Sequence: oligo B6B  
  
 <400> 93  
 aactagtgtg gcagacggtc 20  
  
 <210> 94  
 <211> 20  
 <212> DNA  
 <213> Artificial Sequence  
  
 <220>  
 <223> Description of Artificial Sequence: oligo B5A  
  
 <400> 94  
 tcgatatcct caccgcccgt 20  
  
 <210> 95  
 <211> 20  
 <212> DNA  
 <213> Artificial Sequence  
  
 <220>  
 <223> Description of Artificial Sequence: oligo B6T1  
  
 <400> 95  
 cggatgcatc accggcacgg 20  
  
 <210> 96  
 <211> 20  
 <212> DNA  
 <213> Artificial Sequence  
  
 <220>  
 <223> Description of Artificial Sequence: oligo B6T2  
  
 <400> 96  
 tgggatccgc ggggcggtac 20  
  
 <210> 97

<211> 20  
 <212> DNA  
 <213> Artificial Sequence  
  
 <220>  
 <223> Description of Artificial Sequence: oligo BBB  
  
 <400> 97  
 aactagtgcg atcccgggga 20  
  
 <210> 98  
 <211> 20  
 <212> DNA  
 <213> Artificial Sequence  
  
 <220>  
 <223> Description of Artificial Sequence: oligo BBA  
  
 <400> 98  
 cgtcgatatc ctccaggggc 20  
  
 <210> 99  
 <211> 20  
 <212> DNA  
 <213> Artificial Sequence  
  
 <220>  
 <223> Description of Artificial Sequence: oligo BBT1  
  
 <400> 99  
 tactgcagca caccgggtgc 20  
  
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